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HOSPITALISM:  
ITS EFFECTS  
ON  
THE RESULTS OF SURGICAL OPERATIONS,  
ETC.

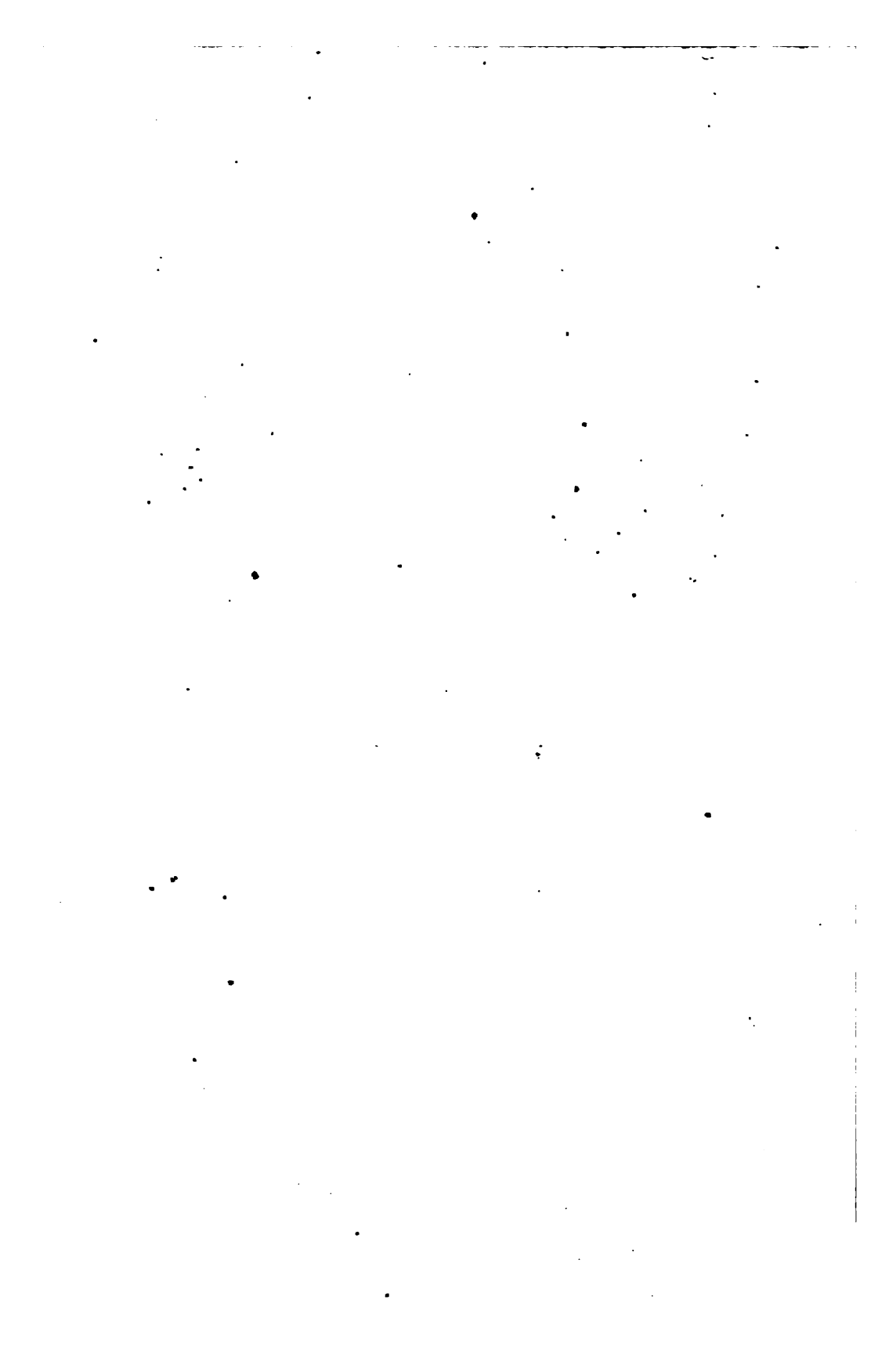
BY  
SIR J. Y. SIMPSON, BART., M.D., D.C.L.,  
PROFESSOR OF MEDICINE AND MIDWIFERY IN THE UNIVERSITY OF EDINBURGH.

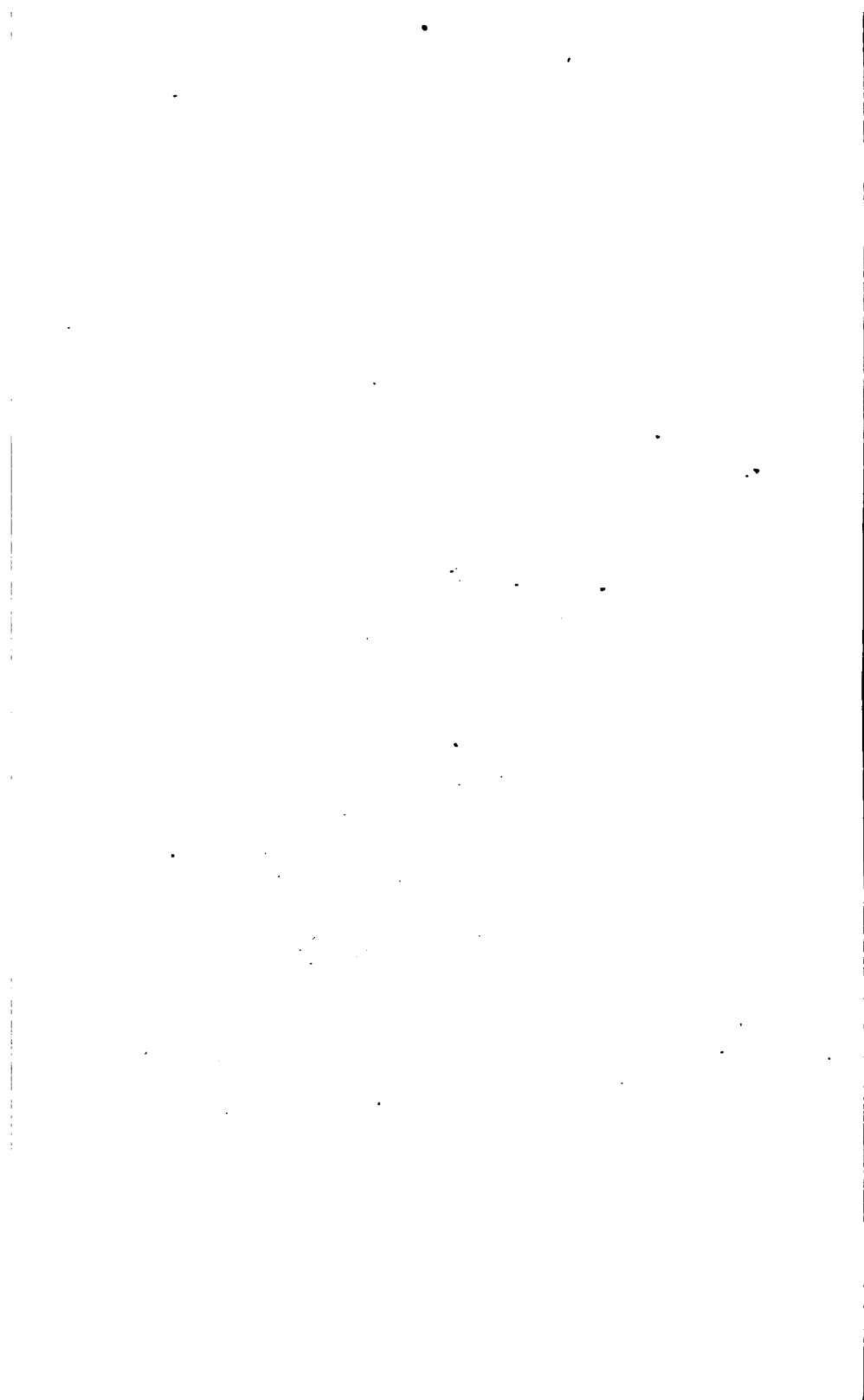
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# HOSPITALISM:

## ITS EFFECTS

ON

THE RESULTS OF SURGICAL OPERATIONS,  
ETC.

BY

SIR J. Y. SIMPSON, BART., M.D., D.C.L.,

PROFESSOR OF MEDICINE AND MIDWIFERY IN THE UNIVERSITY OF EDINBURGH.



PART I.

COUNTRY AMPUTATION STATISTICS.

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and to the hygienic evils which that system has hitherto been made to involve. If it be so, then that system counteracts and cancels all the advances and improvements which modern surgical and medical science has evoked; and we cannot, in my opinion, hope for adequate and commensurate progress in the public practice of the healing art, till our system of hospitalism is more or less changed and revolutionized.

Above twenty years ago, in speaking of the effects and evils of our large hospitals—as these hospitals are at present constructed—I took occasion to remark: “There are few or no circumstances which would contribute more to save surgical and obstetric patients from phlebotic and other analogous disorders, than a total change in the present system of hospital practice. I have often stated and taught, that if our present medical, surgical, and obstetric hospitals were changed from being crowded palaces,—with a layer of sick in each flat,—into villages or cottages, with one, or at most two, patients in each room, a great saving of human life would be effected; and if the village were constructed of iron (as is now sometimes done for other purposes) instead of brick or stone, it could be taken down and rebuilt every few years—a matter apparently of much moment in hospital hygiene. Besides, the value of the material would not greatly deteriorate from use; the principal outlay would be in the first cost of it. It could be erected in any vacant space or spaces of ground, within or around a city, that chanced to be unoccupied; and in cases of epidemics, the accommodation could always be at once and readily increased.” See the *Edinburgh Monthly Journal of Medical Science* for November 1848, p. 328.

Since the date mentioned, I have conversed on many occasions with many medical men upon this subject. I have found, however, that to most professional minds it seemed to be altogether a kind of medical heresy to doubt that our numerous and splendid hospitals for the sick poor could by any possibility be aught than institutions as beneficial in their practical results as they were benevolent in their practical objects. When acting in 1867, at Belfast, as President of the Public Health section of the National Association for the Promotion of Social Science, I spoke of the subject of hospitalism at some length in my inaugural address, and propounded the questions, “To what extent are hospitals, as in general at present constituted, banes or blessings? and how can they be changed so as to convert them from the former to the latter?” I concluded my remarks on this point by again suggesting publicly, that to render our hospitals as healthy and useful as possible, and in order to acquire sufficient space and air and isolation for their sick inmates, they should be changed “from wards into rooms, from stately mansions into simple cottages, from stone and marble palaces into wooden, or brick, or iron villages.” On the same occasion, after speaking of the relative treatment of some medical fevers, etc., in and out of hospitals, and after showing

(chiefly from the large statistics of M. Lefort) that, as a general rule, parturient women recovered in a much larger proportion when delivered in their own homes than when delivered in lying-in hospitals, I proceeded to ask, "In regard to surgical patients in hospitals as compared with surgical patients at home, does the same law hold good as in respect to obstetric patients? At the present time, medical science is, I believe, in want of any sufficient data to determine the question. The general mortality in hospitals after operations is confessedly very great, far greater than was believed a quarter or half a century ago, when no sufficient statistics had been collected on the matter. The man laid on an operating-table in one of our surgical hospitals is exposed to more chances of death than the English soldier on the field of Waterloo. Some authors have collected, on a large scale, the statistical results of some special operations, and particularly of amputation of the limbs. Out of 1656 cases of amputation performed in the hospitals of Paris, and collected by MM. Malgaigne and Trelat, 803 of the patients died, or nearly 1 in every 2.<sup>1</sup> Dr Fenwick has collected together from various sources 4937 cases of amputations of the limbs. Of these, 1562 died, or nearly 1 in every 3 or 4. 'The assertion,' observes Dr Fenwick, 'that one person out of every three who suffers an amputation perishes, would have been repudiated a few years ago as a libel upon the profession, and yet such is the rate of mortality observed in nearly 5000 cases.' Are the results of amputation in dispensary, private, or country practice as deplorable? Adequate data on the matter have not been collected. Certainly the general belief of the profession is, that in country practice amputations are not so frightfully fatal." See the *Transactions of the Social Science Association* for 1867, p. 115.

I have often thought of trying to collect the data referred to in the preceding sentences, and as often delayed the task, as being apparently more a duty pertaining to others. Circumstances, however, connected with the rebuilding of the Edinburgh Hospital, have lately induced me to attempt this statistical inquiry; and the object of the next chapter is to state the results.

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<sup>1</sup> M. Trelat's list contains, besides the major amputations of the limbs, minor amputations also of the hand and foot. Dr Bristowe and Mr Holmes of London, in visiting the Parisian hospitals in order to draw up a report upon them for the medical officer of the Privy Council (Mr Simon), obtained from the government official archives the results of the major amputations of the limbs—that is, of the thigh, leg, arm, and forearm—during the year 1861 in all the Parisian hospitals taken as a whole. The mortality among those operated upon was as high as 1 in  $1\frac{1}{2}$ ; or 3 out of every 5 died. We shall afterwards see that this is nearly double the death-rate which attends upon the same operations in our large and metropolitan British hospitals, in which the mortality is fully 1 in 3; while, as Mr Simon points out, in reference to our smaller and rural British hospitals, the special death-rate from amputations "in the London hospitals is half as high again as in the country hospitals."



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## CHAPTER II.—MORTALITY OF THE MAJOR AMPUTATIONS OF THE LIMBS IN PRIVATE COUNTRY AND PROVINCIAL PRACTICE.<sup>1</sup>

With the hope of collecting sufficient data to approach, if not to determine, the rate of mortality generally attendant upon amputations of the thigh, leg, arm, and forearm, when performed in private country and provincial practice, I addressed the following application—along with the accompanying form of schedule—to numerous medical gentlemen practising in England and Scotland:—

“The relative success of the graver operations in surgery, as performed, first, in hospital practice, and, secondly, in private practice, is at present attracting much attention here and elsewhere.

“There is reason to believe that some of the greater operations—as the various amputations of the limbs—are attended with less mortality in private and in country practice than in hospital practice.

“Already there have been published by various authors ample statistics of the results of amputations of the limbs from many different surgical hospitals. But hitherto there has not been made any collection showing the results of the same amputations, or of any similar operations, in private, and particularly in country practice.

“With a view of making the comparison in question, I should feel

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<sup>1</sup> *Other Operations used as Standards of Comparison.*—Several operations have been suggested and employed as forming in their results statistical criteria or tests of the relative salubrity and success of surgery in different hospitals, and in different practices, and under different conditions. Those operations that have been chiefly used for this purpose are,—Lithotomy, Herniotomy, and Amputation of the Limbs. The two first are not fitted to form tests or standards, in such an inquiry as the present, between the results of hospital practice and of private country practice. For it would be impossible to procure from the country a sufficient number of cases of lithotomy, for example, to make the required comparison, as that operation is rarely performed by the country practitioner; and the patients, being usually quite able to move and travel, usually place themselves under the care of skilled hospital or metropolitan surgeons. Herniotomy, again, is an operation in the successful performance and result of which much depends upon the attainment of the proper period of operating, as well as upon the surgical dexterity and delicacy with which the operation itself is performed. Hence it is not very capable of being used in any comparison between its relative mortality in the hands of a rural practitioner and in the hands of an accomplished hospital surgeon. It would be, on the large scale, a test rather of the operative skill of the practitioner than of the influence upon the patients of external circumstances and surroundings that are independent of the mode in which the operation is conducted. But in this last respect, and for the purpose of comparing the results of surgical operations in country and in hospital practice, the major amputations of the limbs undoubtedly form the best, if not the only adequate, standard. The operation itself of amputation, formidable as it is in its character,—since, generally, it involves the loss of a limb to save the loss of a life,—is not a proceeding attended with much surgical difficulty, or requiring much surgical skill, so that it can be done readily in the country as well as in the hospital; it is resorted to for the same classes of injuries and for the same classes of diseases in the one locality as in the other; and, in rural as well as in hospital practice, it is performed so frequently as to afford sufficient cumulative data for correct statistical deductions.

deeply obliged if you would kindly fill up the included form with the results of all the amputations which you may have had in your own practice. However few may be the amputations of the limbs which you have performed, the notification in the table of their nature and their results (whether the case or cases ended in recovery or in death), will be regarded as a very great favour.

"An accumulation of several hundred returns—even though the numbers in individual practice may not exceed two or three—will go far, it is believed, to throw much light on the momentous subject of the present inquiry.

"It would be an additional favour if you could inform me whether your cases of amputation were in persons belonging to (1) the upper, (2) the middle, or (3) the lower classes; and whether their status in society, or the character of their habitations, appeared to influence the results. It is thought by many that, after amputations and similar great operations, the poor recover in a greater proportion in their own homes than they do in the wards of our very best hospitals."

The included schedule was in the following form :—

*"Results of Amputation of the Limbs in Private Practice."*

Seat of the Amputations.	Primary, or for Injury.		Secondary, or for Disease.	
	Number of Cases.	Number of Deaths.	Number of Cases.	Number of Deaths.
Amputation of Thigh.				
Amputation of Leg.				
Amputation of Arm.				
Amputation of Forearm.				
Total.				

Signature, \_\_\_\_\_  
 Residence, \_\_\_\_\_  
 Date, \_\_\_\_\_"

The two blank pages of the schedule which followed were headed "Remarks," for the purpose of eliciting observations from the gentlemen filling up the returns.

In selecting the practitioners to whom the application and schedules were sent, I avoided, as far as possible, including in the list any members of the profession residing in our large hospital cities and towns, as my object was to obtain the returns principally or entirely from country and provincial professional men. For example, with this view I did not apply in Scotland to any practitioners in Edinburgh, Glasgow, Aberdeen, Dundee, Dumfries, etc. In England the application was chiefly made to practitioners connected with the Poor Law service; but others were included, who appeared likely to be able to furnish the required returns.

Some did not return the schedule; others returned it blank; and, in doing so, they usually stated either that no cases of amputation had occurred in their practice, or that they were so near

some hospital or another as to have been always in the habit of forwarding there any such patients as required amputation.

Several of the returned schedules contained cases of amputations of the limbs, performed not by the practitioners who filled in the schedule, but by their friends. These returns I have not of course used, except when there were data given that enabled the two classes of cases to be separated; because my application was, in each instance, for all the cases of limb-amputation performed by the gentleman himself who returned the schedule; and not for such as he might have seen or known to have been done by others, as such reports of these last did not include and show the results of all the cases operated upon by those other practitioners.

Two or three instances have been reported in the schedules where the amputation was performed in the country, and the patients forthwith sent on into city hospitals. As these hybrid amputations were neither truly hospital, nor truly country cases, I have omitted them altogether from the Table. One of these cases was, during their hospital residence, attacked with erysipelas, and another with gangrene.

A number of gentlemen have informed me that they have repeatedly performed amputations, but have kept no such record of them as to be able to report them with statistical accuracy. Some who have often operated, while unaware of the extent of their numbers, have assured me that they recollected all their fatal cases, and that their number was comparatively small. Thus, in one of the last unfilled schedules which I have received, Dr Redwood of Rhymney, practising in an iron-work district in Monmouthshire, writes me as follows:—"Unfortunately I have kept no account of my cases of amputation of thighs, legs, arms, and forearms. I believe I have had between forty and fifty; certainly more than forty. They all recovered except two, that died from the shock of the accident; one on the table, and the other in a few hours after operating. My successful amputations include three at the shoulder-joint, and one of both legs." In compound fractures (he adds), "where there is tissue left that will continue the circulation below the seat of injury, we save the limb. Assistants fresh from the hospitals are often astonished at what is attempted and effected in this way. . . . Some of the patients are rather hard-drinking men."

In the following Table, No. I., I have entered all the available data that have been furnished to me in answer to my inquiries, whether they were good, bad, or indifferent. In the first part the returns are almost entirely Scottish; the other portions are partly from England and Wales, and partly from Scotland. The numeral in the first row of the Table is the number attached to each schedule as numbered and entered, so as to facilitate reference to it, etc.

TABLE I.—*Of Amputations and their Results—Primary or for Injury, and Secondary or for Disease—of the Thigh, Leg, Arm, and Forearm, performed in Private Practice by Country and Provincial Practitioners; Amputations through the Joints not included.*

No. of the Schedules.	Primary.								Secondary.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1	2	0	..	..	2	0	..	..	..	..	..	..	..	..	..	..
2	..	..	..	..	1	0	1	0	..	..	..	..	..	..	..	..
3	1	0	..	..	2	0	1	0	..	..	1	0	..	..	..	..
4	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..
5	1	0	..	..	1	0	1	0	..	..	..	..	..	..	..	..
6	1	1	1	0	4	0	0	..	..	..	..	..	..	..	..	..
7	1	0	2	0	2	0	3	0	..	..	1	0	..	..	..	..
8	..	..	..	..	..	..	..	..	..	..	2	0	..	..	..	..
9	..	..	2	1	..	..	2	0	1	1	..	..	..	..	..	..
10	1	0	2	0	..	..	1	0	..	..	1	0	..	2	0	..
11	1	1	1	0	..	..	..	..	..	..	..	..	..	..	..	..
12	2	1	..	..	..	..	..	..	1	1	..	..	..	..	..	..
13	..	..	1	1	..	..	..	..	1	0	..	..	..	..	..	..
14	1	0	1	0	2	0	1	0	1	0	..	..	..	..	..	..
15	..	..	..	..	..	..	..	..	2	0	1	0	..	..	..	..
16	1	1	..	..	1	0	..	..	..	..	..	..	..	..	..	..
17	..	..	..	..	1	0	3	0	4	1	2	0	2	0	..	..
18	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..
19	1	1	1	1	..	..	..	..	..	..	1	0	..	..	..	..
20	1	0	..	..	1	0	..	..	..	..	1	0	..	..	..	..
21	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..
22	1	1	5	0	..	..	3	0	2	1	..	..	1	0	..	..
23	1	1	1	0	..	..	..	..	..	..	..	..	1	0	..	..
24	2	0	..	..	3	0	1	0	4	0	1	0	..	..	..	..
25	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..
26	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..
27	..	..	..	..	2	0	..	..	2	1	2	0	1	0	..	..
28	..	..	..	..	..	..	1	0	..	..	..	..	1	..	..	..
29	..	..	..	..	1	0	1	0	2	1	..	..	1	0	1	0
30	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..
31	2	0	5	0	4	0	3	0	4	0	1	0	..	..	..	..
32	..	..	2	0	1	0	5	0	..	..	1	..	..	..	..	..
33	..	..	..	..	..	..	..	..	..	..	1	1	..	..	..	..
34	4	1	1	0	1	0	..	..	1	0	..	..	..	1	0	..
35	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..
36	..	..	..	..	2	0	2	0	1	0	..	..	..	..	..	..
37	..	..	..	..	..	..	..	..	..	..	2	0	..	..	..	..
38	2	0	2	0	2	0	..	..	..	..	1	0	1	0	..	..
39	3	0	..	..	1	..	..	..	1	0	..	..	..	..	..	..
40	3	1	1	0	1	0	1	0	..	..	..	..	..	..	..	..
41	1	0	1	0	..	..	..	..	..	..	..	..	..	..	..	..
42	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..

No. of the Schedules.	Primary.								Secondary.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
43	1	0	..	..	2	0	1	0	5	0	5	1	1	0	..	..
44	4	1	10	2	13	1	13	0	12	0	8	0	..	..	..	..
45	..	..	1	1	1	0	..	..	..	..	..	..	..	..	..	..
46	..	..	..	..	1	0	..	..	..	..	1	0	..	..	..	..
47	..	..	1	0	1	0	..	..	..	..	..	..	..	..	..	..
48	..	..	1	0	..	..	..	..	..	..	..	..	..	..	..	..
49	1	0	5	0	3	0	0	..	..	..	1	1	..	..	..	..
50	5	1	6	0	4	0	3	0	..	..	..	..	..	..	..	..
51	..	..	..	..	2	0	..	..	..	..	1	0	..	..	..	..
52	1	1	1	0	..	..	..	..	8	0	..	..	..	..	..	..
53	..	..	1	0	..	..	..	..	..	..	1	0	..	..	..	..
54	1	0	..	..	..	..	1	0	1	0	..	..	..	..	..	..
55	2	0	..	..	1	1	0	0	1	0	..	..	1	1	..	..
56	..	..	1	1	1	0	1	0	..	..	..	..	..	..	..	..
57	2	0	..	..	..	..	..	..	..	..	1	0	..	..	..	..
58	..	..	..	..	..	..	1	0	..	..	1	0	1	1	..	..
59	..	..	3	0	1	0	2	0	1	0	..	..	..	..	..	..
60	..	..	1	0	..	..	..	..	1	0	..	..	..	..	..	..
61	5	1	4	0	2	1	..	..	1	1	4	0	..	..	..	..
62	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..
63	..	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..
64	..	..	..	..	1	0	..	..	2	0	..	..	..	..	..	..
65	..	..	1	0	1	0	1	0	1	0	..	..	..	..	..	..
66	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..
67	..	..	1	0	..	..	1	0	..	..	1	0	..	..	1	0
68	3	1	4	1	4	0	3	0	..	..	..	..	..	..	..	..
69	..	..	..	..	1	0	..	..	..	..	1	0	1	0	..	..
70	..	..	1	0	..	..	2	0	..	..	..	..	..	..	..	..
71	2	1	3	0	4	0	3	0	4	1	2	0	1	0	..	..
72	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..
73	..	..	..	..	1	0	1	0	1	1	..	..	..	..	..	..
74	1	1	..	..	..	..	..	..	..	..	..	..	..	..	..	..
75	1	0	..	..	1	0	1	0	3	0	..	..	..	..	..	..
76	..	..	1	0	1	1	..	..	..	..	2	0	..	..	1	0
77	2	0	..	..	..	..	..	..	..	..	2	0	..	..	..	..
78	1	0	..	..	..	..	..	..	..	..	..	..	..	..	..	..
79	2	0	4	2	1	0	..	..	..	..	..	..	..	..	..	..
80	1	0	2	0	1	0	2	0	1	1	..	..	..	..	1	0
81	..	..	..	..	..	..	1	0	..	..	1	1	..	..	..	..
82	..	..	2	1	..	..	..	..	6	2	6	1	2	0	..	..
83	1	0	..	..	1	0	3	0	..	..	..	..	..	..	..	..
84	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..
85	..	..	2	0	1	0	1	0	1	0	2	0	..	..	..	..
86	1	0	..	..	2	0	..	..	2	1	..	..	..	..	..	..
87	..	..	1	0	..	..	1	0	2	0	1	1	..	..	..	..
88	..	..	..	..	1	0	..	..	..	..	..	..	..	..	..	..
89	..	..	..	..	..	..	3	0	6	1	3	0	3	0	1	0
90	1	1	7	0	1	0	2	0	2	0	..	..	..	..	..	..
..	..	..	..	..	2	0	..	..	..	..	..	..	..	..	..	..
..	..	..	..	..	0	..	..	..	1	0	..	..	..	..	..	..
..	1	0	4	0	3	0	4	0	2	0	..	..	..	..	..	..
..	..	..	..	..	..	..	..	..	1	0	..	..	..	..	..	..

No. of the Schedules.	Primary.								Secondary.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
94	2	1	4	0	..	..	..	..	2	1	0	..	..	..	..	..
95	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..
96	..	..	..	..	..	..	..	..	1	1	..	..	..	..	..	..
97	1	0	..	..	1	0	1	0	1	0	..	..	..	..	..	..
98	..	..	2	0	2	0	3	0	..	..	4	0	..	..	..	..
99	1	1	..	..	..	..	..	..	1	0	..	..	..	..	..	..
100	3	1	2	0	1	0	1	0	..	..	..	..	..	..	..	..
101	..	..	2	1	..	..	..	..	..	1	0	..	..	..	..	..
102	1	0	..	..	1	0	..	..	..	..	..	..	..	..	..	..
103	..	..	..	..	2	0	..	..	..	..	..	..	..	..	..	..
104	3	1	4	0	2	0	3	0	..	..	2	0	1	0	1	0
105	..	..	3	0	..	..	..	..	1	0	0	2	0	..	..	..
106	..	..	2	1	1	1	..	..	5	0	2	0	..	..	1	0
107	..	..	..	..	1	1	..	..	7	0	..	..	..	..	..	..
108	..	..	..	..	..	..	1	0	..	..	..	..	..	..	..	..
109	..	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..
110	..	..	..	..	2	0	..	..	1	0	..	..	..	..	..	..
111	1	0	..	..	..	..	1	0	..	..	..	..	..	..	..	..
112	..	..	2	0	..	..	2	0	1	0	..	..	1	0	1	0
113	..	..	..	..	1	0	..	..	1	1	..	..	..	..	..	..
114	..	..	..	..	..	..	..	..	4	1	..	..	1	0	..	..
115	..	..	1	1	2	0	2	0	..	..	..	..	2	0	..	..
116	1	0	..	..	..	..	..	..	..	..	1	0	..	..	..	..
117	..	..	..	..	..	..	..	..	..	1	2	1	..	..	..	..
118	..	..	1	0	..	..	1	0	1	1	..	..	..	..	..	..
119	1	1	1	0	1	0	..	..	1	0	..	..	..	..	..	..
120	..	..	..	..	..	..	..	..	..	..	1	0	..	..	..	..
121	2	0	..	..	1	0	1	0	..	..	..	..	..	..	..	..
122	..	..	1	0	1	0	3	0	1	1	..	..	..	..	1	0
123	..	..	2	1	..	..	..	..	..	..	2	1	2	0	..	..
124	..	..	..	..	2	0	..	..	2	1	..	..	1	0	..	..
125	2	1	..	..	..	..	1	0	..	..	..	..	..	..	..	..
126	2	1	2	0	1	0	1	0	1	0	..	..	..	..	..	..
127	..	..	1	1	..	..	..	..	7	0	2	0	..	..	..	..
128	..	..	2	1	..	..	2	0	..	..	..	..	..	..	..	..
129	..	..	4	0	..	..	..	..	..	..	..	1	0	..	..	..
130	..	..	..	..	..	..	..	..	2	0	..	..	..	..	..	..
131	..	..	..	..	..	..	..	..	2	1	1	0	1	0	..	..
132	..	..	1	0	2	1	2	0	2	1	..	..	1	0	..	..
133	4	1	2	0	3	0	..	..	3	0	2	0	..	..	..	..
134	3	2	2	0	1	0	1	0	..	..	..	..	..	..	..	..
135	1	0	..	..	3	0	1	0	3	0	..	..	..	..	..	..
136	..	..	1	1	..	..	..	..	..	..	..	..	..	..	..	..
137	1	1	2	0	3	0	1	0	3	0	..	..	..	..	..	..
138	..	..	..	..	1	0	..	..	2	1	..	..	..	..	..	..
139	..	..	..	..	1	0	1	0	..	..	..	..	..	..	..	..
140	2	0	1	0	2	0	4	0	2	0	..	..	..	..	..	..
141	..	..	1	0	1	0	1	0	2	0	1	0	..	..	1	0
142	..	..	..	..	..	..	..	..	5	0	4	1	3	0	..	..
143	..	..	..	..	..	..	..	..	2	0	1	0	..	..	4	0
144	..	..	..	..	1	0	1	0	..	..	..	..	..	..	..	..



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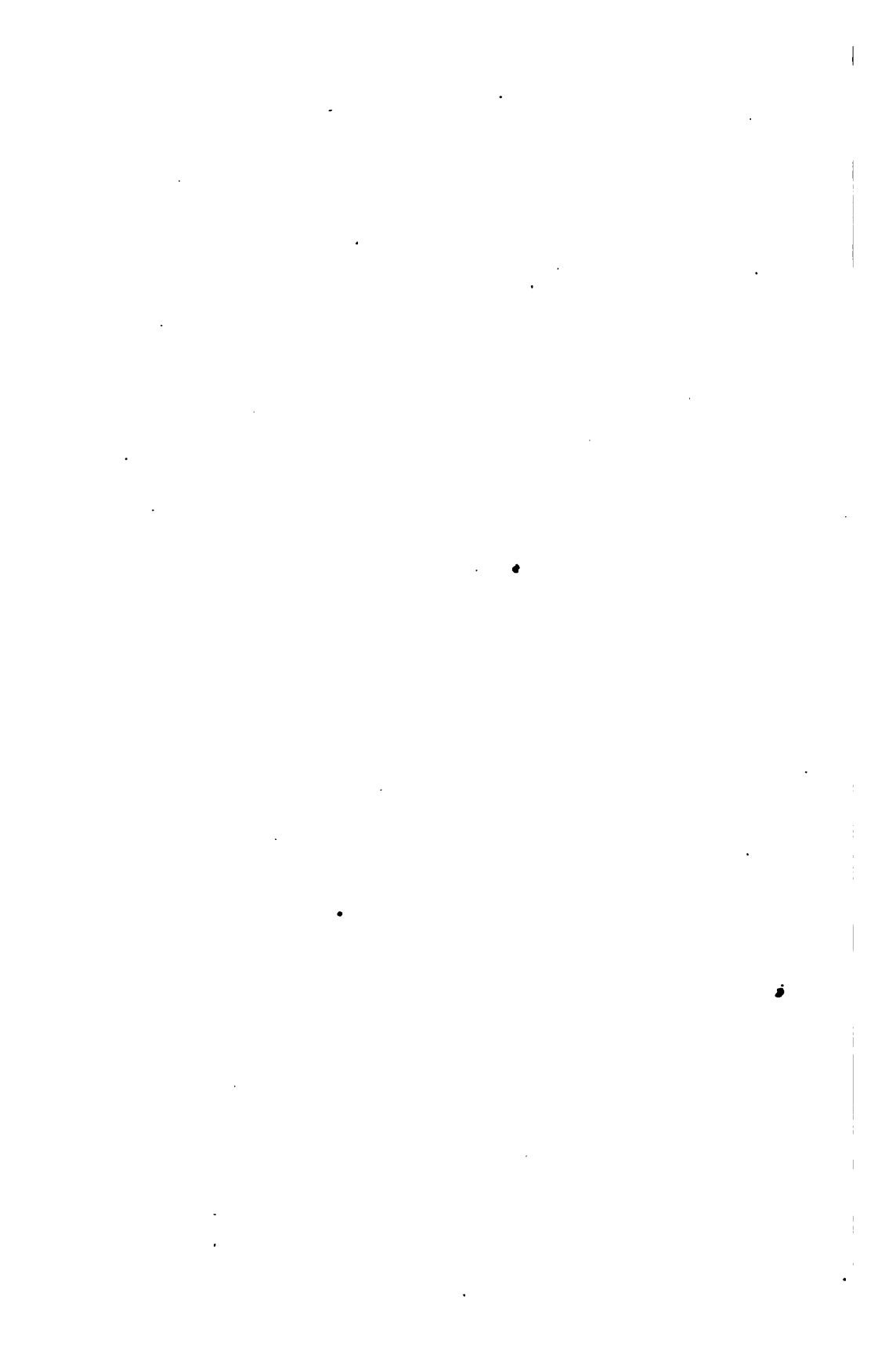
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# HOSPITALISM:

## ITS EFFECTS

ON

THE RESULTS OF SURGICAL OPERATIONS,

• ETC.

BY

SIR J. Y. SIMPSON, BART., M.D., D.C.L.,

PROFESSOR OF MEDICINE AND MIDWIFERY IN THE UNIVERSITY OF EDINBURGH.

## PART II.

2098 COUNTRY AMPUTATIONS;

2089 HOSPITAL AMPUTATIONS.

EDINBURGH: PRINTED BY OLIVER AND BOYD.

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# HOSPITALISM AND ITS EFFECTS.

## PART II.

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### CHAPTER III.—ON SOME MINOR POINTS PERTAINING TO THE COLLECTION OF AMPUTATIONS IN TABLE I.

MY chief object in collecting the 2000 and odd cases of amputation recorded in Table I. was to ascertain what was the mortality in private country and provincial practice of the four major amputations of the limbs<sup>1</sup> when taken as a class of operations,—when taken as individual operations,—and when performed for the effects of injury or for the effects of disease. As already stated, however, there was added to the schedule which was intended to elicit these leading data, a vacant space, headed “Remarks,” under the belief that valuable observations of various kinds might be appended by some of the reporters. In this hope I have not been disappointed. Perhaps I might have added several more special and direct questions on various minor matters; but I avoided doing so under the conviction that, if I asked too much or too many things, I should be liable to get the primary and simple points regarding the mortality, buried and lost in points of infinitely less importance; or, indeed, receive no answer at all.

In the present and following chapters I shall throw together some of the more interesting items of information contained in these “Remarks.”

#### *Double Amputations in twenty-three of the Cases.*

The cases enumerated in Table I. amount to 2098. This is the number of patients operated upon; but the actual number of amputations performed was greater, being 2122 in all. For in twenty-three instances of severe injuries, involving two extremities,

<sup>1</sup> Let it be here explicitly noted, that the present collection of limb-amputations in country and in hospital practice is limited to the *four* amputations through the bones of the thigh, leg, arm, and forearm, and does not include any of the other *six* amputations of the limbs through the joints, viz., the hip, knee, ankle, shoulder, elbow, and wrist joints. To have taken into the investigation disarticulations or amputations through the joints, would have complicated and extended the whole inquiry very greatly and very needlessly.

the patients were subjected to more than one amputation; as the thigh and leg, two legs, etc. Sometimes, in the schedules, as they were returned to me, these double amputations were entered as two amputations; but in accordance with the practice followed, I believe, in most hospital returns, I have given in the table each double amputation as one case; entering it under the head of the greater of the two amputations that were performed, when the two amputations were on different parts of the two limbs. Several correspondents who have added few or no "remarks" have, if I may judge from the number of their primary or traumatic cases, possibly or probably met with additional double amputations, though they have not considered them of sufficient interest to report upon in their returns.<sup>1</sup>

TABLE II.—*Of the Results of Twenty-three Double Amputations after Complex Injuries.*

No. of Schedule.	Double Primary Amputations.	No. of Cases.	Deaths.
7	Both forearms, . . . . .	1	0
22	Both legs, . . . . .	1	0
24	Thigh and arm at shoulder-joint, . .	1	0
31	Both arms, . . . . .	1	0
34 {	Thigh and arm, . . . . .	1	0
	Thigh and leg, . . . . .	1	1
43	Both forearms, . . . . .	1	0
44	Both legs, . . . . .	1	0
49 {	Both legs, . . . . .	1	0
	Leg and arm, . . . . .	1	0
59	Both legs, . . . . .	1	0
65	Both forearms, . . . . .	1	0
78	Thigh and leg, . . . . .	1	0
107	Arm and forearm, . . . . .	1	1
125	Both thighs, . . . . .	1	1
133	Both thighs, . . . . .	1	1
134	Thigh and arm, . . . . .	1	1
135	Both arms, . . . . .	1	0
184	Thigh and leg, . . . . .	1	1
200	Both forearms, . . . . .	1	0
344 {	Thigh and forearm, . . . . .	1	0
	Arm and forearm, . . . . .	1	0
	Both thighs, . . . . .	1	1
Total, . . . . .		23	7

The mortality among these cases of primary double amputations, viz., 7 deaths in 46 amputations, performed upon 23 individuals, is strikingly small, when we take into consideration the terrible character of the compound injuries under which the patients suffered.

<sup>1</sup> The three cases of double amputation in the Table occurred to Mr Hinton of Hinton. Mr Moodie of Stirling and Dr Thomson of Motherwell have each reported two double amputations.

In our large and metropolitan hospitals, as we shall see in the sequel, the mortality attendant upon *single* amputations, primary and secondary, is greater. And, in these hospitals, double amputations seem to be attended by a frightful mortality. Out of a list of the last 11 double primary amputations performed in the Edinburgh Infirmary, and furnished to me by Mr M'Dougall, 10 of the patients died. The case which survived was a double amputation through the knee-joints, and does not therefore properly belong to the present inquiry, as it excludes all operations *through* the joints.

Some of the double amputations are shown in the Table to be greatly more dangerous than others; those involving the thigh being apparently much the most perilous.

*Upper Extremities.*—Out of 4 double amputations in which both forearms were removed, all the 4 patients recovered; 2 other patients, in whom both arms were amputated, recovered also; as did 1 in whom the opposite arm and forearm were removed; and 1 only out of the 8 in whom the double amputations were confined to the upper extremities died. In this eighth and fatal case, the right arm and left forearm were amputated.

*Lower Extremities.*—In 4 cases both legs were amputated; all the patients survived. In a fifth the amputation of the leg and arm proved successful. In 10 cases in which amputation of the thigh formed one of the forms of dismemberment, 6 deaths occurred. In 1 the thigh and forearm, and in 2 the thigh and arm were amputated; all three recovered. In 3 cases a thigh and the opposite leg were amputated; 2 out of the 3 succumbed. In 3 cases both thighs were amputated; all 3 patients died.<sup>1</sup>

#### *Age of the Patients.*

I originally sent out no query about the ages of the patients operated upon, because it seemed to be unnecessary. For there appeared no reason whatever for believing that the general average of ages of those submitted to amputation in country practice would differ in any important respect from the general

<sup>1</sup> In an annotation to his schedule, Mr Anderson of Castle-Douglas relates a case where a double amputation was performed by machinery, and not by the knife of the surgeon; and which is, therefore, not included in Table I. But this double amputation deserves to be recorded. "A girl," he states, "about ten years of age, amusing herself putting straws into a lint-mill, had her hands caught by the machine, and gradually drawn inwards, till stopped at the shoulders, when they were completely detached close to the shoulder-joints. There was no bleeding, although the arteries were seen on the surface of the wounds pulsating strongly. One sharp projecting piece of bone was removed by pliers. Nothing more was done, as the attempt to remove ragged pieces of muscle and skin produced such violent excitement in the girl,—it was before chloroform was known,—that we were compelled to desist. Wet rags were laid over the wounds; everything went on well; granulations sprang up and covered the ends of the bones; and in due time cicatrization was completed with so little assistance that, it may be said, the mill amputated the arms, and the *vis medicatrix nature* effected the cure of the stumps."

average of ages of those submitted to amputation in hospital practice. Some of my correspondents have incidentally given the ages of their patients. These ages vary from 1 up to 84 years. The youngest subject noted is an infant about twelve months old. The case occurred in the practice of Dr Livingston of Wishaw. The child's arm was smashed by a railway-waggon, and Dr Livingston was obliged to amputate the limb high up. The little patient did well for ten days, but ultimately sank. Several gentlemen speak of the amputations which they practised being in "old" or "very old" individuals, without specifying more particularly this state of advanced age. In others of these instances the age of the patients is specified, and the following Table shows the cases of this kind which I have found in the annotations of my correspondents :—

TABLE III.—*Result of Amputations by Country Practitioners on Patients of 70 years and upwards.*

No. of Schedule.	Age of Patient.	Special Amputation.		Recovered.	Died.
		For Injury.	For Disease.		
289	70 . . . .	. . . .	Leg . . . .	0	1
188	70 . . . .	Arm . . . .	. . . .	1	0
45	70 . . . .	Leg . . . .	. . . .	0	1
118	Above 70 . . . .	. . . .	Thigh . . . .	0	1
273	72 . . . .	Arm . . . .	. . . .	1	0
268	Above 72 . . . .	. . . .	Thigh . . . .	1	0
43	73 . . . .	. . . .	Leg . . . .	1	0
131	73 . . . .	. . . .	Arm . . . .	1	0
354	74 . . . .	Leg . . . .	. . . .	0	1
240	74 . . . .	Leg . . . .	. . . .	1	0
257	74 . . . .	Arm . . . .	. . . .	0	1
222	75 . . . .	. . . .	Forearm . . . .	1	0
359	75 . . . .	Arm . . . .	. . . .	1	0
43	77 . . . .	. . . .	Leg . . . .	0	1
295	78 . . . .	Leg . . . .	. . . .	1	0
144	Between 70 and 80 . . . .	Forearm . . . .	. . . .	1	0
106	80 . . . .	Leg . . . .	. . . .	1	0
27	Above 80 . . . .	. . . .	Thigh . . . .	0	1
117	" 80 . . . .	. . . .	Leg . . . .	1	0
141	82 . . . .	. . . .	Thigh . . . .	1	0
1	84 . . . .	Thigh . . . .	. . . .	1	0
17	84 . . . .	. . . .	Thigh . . . .	0	1
Total .				14	8

This mortality rate of 1 death in 2·7, or of 8 out of 22, is, as we shall see subsequently, not more than the rate of mortality in most of our large and metropolitan hospitals in patients of *all* ages; consequently forms an amount of mortality much smaller than *a priori* expected in a set of patients operated upon after reached or passed the "threescore years and ten."

*Injuries and Diseases necessitating the Amputation.*

Though the causes leading to the amputations are often mentioned in the returns, I do not know that anything special can be adduced under this head.

In the traumatic or primary cases, the injuries noted are chiefly for railway and other accidents connected with mining, iron-works, and various descriptions of machinery. Some are the results of high falls; several, and particularly the amputations of the forearm, from gun-shot wounds, bursting of guns, etc. The unguarded country thrashing-machine is very often mentioned as the source of the mutilations that led to amputations in the upper extremity. The super-vention of gangrene following upon injuries, such as in compound fractures, etc., is repeatedly mentioned as the reason for having had, sooner or later after the accidents, recourse to amputation. In two or three cases, suppuration of the knee-joint following upon its puncture or injury, is noted as the cause leading to the operation.

Among the pathological series, or amputations for disease, I find annotated most frequently diseases of the joints and bones. In various instances, the existence of cancerous deposits and ulcers in the amputated portion of limb, of fungus hæmatodes, of tumours (one lived for twenty years after amputation<sup>1</sup>), of burns and their effects, of frostbites, of dry or senile gangrene, led to the operation. In one case it was deemed necessary to stay the bleeding from a popliteal aneurism; in another instance it was had recourse to in the faint hope of arresting tetanus. The patient, in the practice of Mr Boyle of Newquay, had a compound fracture of the leg, and progressed favourably for twelve days, when symptoms of tetanus supervened. Amputation was then adopted as a last resource. Death took place sixteen hours afterwards.

#### CHAPTER IV.—CAUSES OF DEATH IN THE FATAL CASES OF AMPUTATION.

The primary questions of the actual death-rate—whether high or low—attendant upon all the four major amputations of the limbs, collectively and individually,—and attendant upon these same amputations when performed for the results of injury and for the results of disease, form the special objects of our present investigation; and the whole inquiry has been conducted more particularly with a view of ascertaining the relative effects of place or locality, or of the conditions of hospitalism and the conditions of private rural practice upon the results.

My object has been to ascertain as far as possible the differences, if any, in the death-rate of the major amputations under the

<sup>1</sup> It was a case of amputation of the thigh, in the practice of Dr Falla of Jedburgh. The tumour was fourteen pounds in weight, extended from the knee to the ankle, was of a fatty-like structure internally, and "had a bleeding fungus of nearly five inches in diameter" on a portion of its surface. The man (writes Dr Falla) is in perfect health now—twenty years after the operation.



different circumstances last alluded to. It does not come within the scope of the present inquiry to push the investigation into other more minute matters, such as the modes of performing the amputations by the flap or circular or ovoid method, the modes of arresting the hæmorrhage, or the modes of dressing the stump, etc., or the effects of age, sex, season, etc., upon the results. Nor does the pathological cause or causes of death, in the cases which ended fatally, form in any direct way a special object in our inquiry. But as few or no data on this last point exist in reference to amputations in rural practice, perhaps the following particulars may interest some readers:—

Out of the 227 deaths tabulated in Chapter II., the apparent causes of the fatal issue have been returned in above 160 of the cases as follows:—

I. *Shock*.—This is entered as the most frequent cause of death; the patient sometimes dying of it upon the operating table; or within a few hours; or within a day or two. In some cases the shock from the injury and the attendant hæmorrhage itself is mentioned as being so severe as to offer but a very forlorn hope for the success of the amputation. “Shock” is returned as the cause of death in 63 cases, including 36 amputations of the thigh, 21 of the leg, and 6 of the arm. Of these 63 cases, 56 were amputations for the results of injury, and 7 for the results of disease.

II. *Exhaustion* is returned as the cause of death in 28 cases, viz., in 19 amputations of the thigh, and 9 of the leg. Of the 28 amputations ending ultimately after a few days, and sometimes after weeks, in alleged “exhaustion,” 13 were primary and 15 secondary amputations. In some, the exhaustion is spoken of as combined with delirium tremens.

III. *Pyæmia* is described as the pathological cause of death in 8 cases—all traumatic; viz., in 5 amputations of the thigh and in 3 of the leg for injury or its consequences. Perhaps some surgeons would have considered a few of the cases entered under other heads as referable to forms of pyæmia.

IV. *Gangrene of the stump* is returned as the cause of death in 18 cases; 12 of them primary and 6 of them secondary amputations. In several it existed before amputation. Of the 18 cases, 8 were amputations of the thigh, and 9 were amputations of the leg. In the only 2 amputations of the forearm that were fatal, gangrene is given as the cause of death.

V. *Secondary hæmorrhage* is referred to as having produced the fatal issue in 9 cases, viz., in 4 amputations of the thigh, and 5 of the leg. Of these 9 amputations, 4 were primary or traumatic, and 5 were secondary or for disease. In 1 of the thigh-amputations, the reporter, Mr Edwards of Wiveliscombe, observes, “Death was caused by hæmorrhage before and after operation, the case being fungus hæmatodes.” This was the only unsuccessful case in amputations performed by Mr Edwards.

VI. *Tetanus*.—From it 11 deaths resulted, all of them, with one exception, after amputations for injury; 2 of them in the practice of one surgeon. Of the 11 deaths, 4 were after amputations of the thigh, 6 after amputations of the leg, and 1 after amputation of the arm.

VII. *Internal Injuries*.—In a considerable number of the cases entered in the Table as fatal after primary amputations, the alleged cause of death is some injury or injuries, generally internal, received at the same time with the injuries to the limb that necessitated its amputation. In 13 of these cases, 7 were amputations of the thigh, 4 of the leg, and 2 of the arm. The coexistent internal lesions returned as the causes of death were in different cases injuries of the brain, lungs, bladder, fractures of the skull, ribs, etc.<sup>1</sup>

VIII. *Miscellaneous Causes*.—Of chest affections returned as causes of death are several inflammatory complications, as 4 cases of fatal pneumonia, 3 of bronchitis, 2 of pleurisy, and 1 of hydrothorax. Pulmonary phthisis is entered as the cause of death in 7 or 8 patients. Gastric irritation of several weeks' duration after the amputation, and chronic and acute diarrhoea, are reported as the causes of death in 3 or 4 cases; convulsions in 2 or 3 others; encephalitis in 1; hectic fever and suppurations in 2 more; and a large abscess of the neck in a third; erysipelas formed a fatal complication in 1 case; 1 died of scarlatina; 1 in the eighteenth day after operation, of an attack of influenza; 1 some weeks after, of

<sup>1</sup> *Internal Injuries in some of the fatal Primary Amputations*.—Take, for example, the following extracts as illustrations of the remarks in the text:—"The death in the primary arm case cannot fairly be put down as a death from amputation, as the person was otherwise severely injured, and actually died of brain concussion and compression a few hours after the operation."—*Mr Troup of Auchtermuchty*. "The case of fatal primary amputation of the leg was one of railway smash, and was complicated with fracture of the skull and concussion of the brain. The cause of death was encephalitis."—*Dr Drew of Chapelton*. "In the fatal primary amputation, the patient really died in consequence of compression of the brain from extravasated blood, having a fracture of the skull."—*Mr Grindrod of New Mills*. In one fatal case out of nine amputations, "the one death was not the result of the operation, but rather of the extent and severity of the injury which rendered the operation necessary."—*Mr Baillie of Markinch*. In a fatal thigh-amputation, the patient "died in consequence of internal injuries."—*Dr Paterson of Bridge-of-Allan*. In two fatal primary amputations of the thigh and leg, "the deaths resulted directly from hæmorrhage prior to the operation, and, therefore, it is scarcely fair to count them."—*Mr Eames of Pulham*. "Hardly expected my patient to recover from his amputation, in consequence of the severe nature of his injury and the loss of blood; for he had his leg completely severed at the knee-joint by the friction of a heavy pit-chain, and lost a great amount of blood before I saw him."—*Mr Dow of Dunfermline*. "Out of fourteen cases, with two deaths, my leg case was fatal from injury to the bladder, and I had a shoulder-joint amputation which was fatal from injuries to the lungs."—*Dr Macclatchy of Kilmarnock*. "The death after amputation of the thigh occurred in the case of a man who fell to the ground from a great height. He sustained a bad compound fracture of the thigh, and was, besides, much injured internally, surviving the operation only 48 hours. I do not consider his death fairly assignable to the operation. Several of his ribs were broken, his lungs injured, and general emphysema supervened."—*Dr Steele of Montrose*; etc., etc., etc.

general anasarca, the stump being "perfectly healed before death," etc.

*Date of Death.*—In some returns of amputations which have been published in this and in other countries, it has been sometimes held justifiable to enter a case as successful when the patient survived the operation above a certain limited period, as four, five, or six weeks. I have, however, entered the cases as fatal, even when death did not take place for a longer period, and the pathological cause of it was not directly connected with the operation as in the last case mentioned in the preceding paragraph. Or take phthisis pulmonalis, as an example. In relation to one of his thigh-amputations for chronic disease of the knee, Dr Gavin of Strichen remarks, "Death took place about a month after amputation. It was really," he adds, "a case of death from pulmonary consumption; for at no time were there any symptoms directly caused by the operation that produced any anxiety." Out of other instances in which tubercular phthisis is returned as the cause of death after amputation, there is one of amputation of the thigh by Mr Day of Harlow, where the patient died after six weeks; another of thigh-amputation by Mr Ronald of Ayr, where the patient died two months after the operation; and a third by Dr Henry of Arroquhar, where death did not supervene till three months. But I have placed all these instances as amputations followed by death, though the date of death and the cause of it might possibly, in the opinion of some, have taken them and other like cases out of the category of fatal issues. Again, Dr Forrest of Motherwell, in reporting 13 cases of amputation which he had performed, remarks, in reference to one fatal primary leg-amputation,—"*The amputation did well*, but the thigh was severely bruised, deep-seated abscess formed, and he died from exhaustion at the end of four months." Perhaps in respect to this and similar cases it might be argued that, as "*the amputation did well*," and was not apparently the pathological cause of the patient's death, the death should not be entered as the result of the amputation. I have followed, however, in this and other examples the safer statistical rule of holding such cases to be amputations ending in death; as is done, I believe, in those hospital returns that are the most to be relied upon for their accuracy.

#### CHAPTER V.—CLASSES OF PATIENTS ON WHOM THE TWO THOUSAND AMPUTATIONS WERE PERFORMED; AND THE GENERAL CHARACTER OF THEIR HABITATIONS.

In the schedules sent out, in addition to the results of the four amputations of the limbs, I stated that it would be considered an additional favour if my correspondents would inform me whether their cases were in persons belonging to the upper, the middle, or the lower classes, and whether the character of their habitations appeared to influence the chances of death or recovery.

A very few of the two thousand patients—not above half-a-dozen—are reported to me as belonging to the upper classes; and a much larger number—perhaps eight or ten per cent. of the whole—as belonging to the middle classes of society. But the great mass of those operated upon were artisans, labourers, farm-servants, miners, iron-workers, quarrymen, etc., or some members of their families,—in short, individuals belonging to such a class as, in our large towns and cities, would be generally sent into hospitals.

The house accommodation of this latter class, upon whom the amputations were thus chiefly or almost entirely performed, was not such as most hospital surgeons would deem eligible. In many cases the chamber in which the patient was laid, even when small, was no doubt clean, comfortable, and tidy; but in most the bed and other accommodation was sufficiently stinted and limited. A few extracts, however, from the notes of some of my correspondents will illustrate this observation better than any didactic statement.

A large number of the cases of amputation were performed at their own houses on workers in mines, iron-factories, etc. Their house accommodation is, as a rule, usually rather poor; but the general free ventilation of their cottages and hovels more than compensates for their other deficiencies. Thus, Dr Stewart of Kirkin-tilloch, in sending me a list of 25 limb-amputations which he had performed, with 24 recoveries and one death, remarks:—"All my operations, except one, were among miners. Their dwellings were composed of *two* rooms, but the doors were always kept open. The only death in my surgical practice (being one in ten primary amputations of the thigh) was in a fisherwoman, who met with a railway accident. She died of bronchitis ten days after the operation. In the operations for the scrofulous diseases of joints, I found that the patients immediately began to improve after the operation was performed, and all made good recoveries." In his schedule, Dr Boyd of Slamannan observes:—"In most of my cases the domestic accommodation has been of the most defective nature, but country air and thorough ventilation from open doors and constant fires atone for many other deficiencies. . . . I would consider it," he adds, "my duty to undertake a formidable operation in a *colliery row* rather than send in the patient to the best-conducted hospital, notwithstanding the immeasurable superiority of diagnostic skill and operative dexterity to be had there." Out of 6 limb-amputations, Dr Boyd has lost only one, viz., a primary thigh-amputation in a stoker, for a severe railway accident. He died of shock in two hours. Writing from the same locality, and practising, I believe, among the same class of patients, Mr Waddell reports to me 10 cases of primary amputations of the limbs, all of them successful. One of my correspondents, Mr Cribbes of Gorebridge, after speaking of all wounds in his district,—and the wounds are many among his colliery patients,—healing, as regards both time and results, rapidly and satisfactorily, states:—"In none

of them have I known erysipelas or fatal results ensue;" and he adds, "these remarks apply wholly to the mining population, who are, after all, blest with nothing approaching to sanitary measures excepting the free blast of heaven, which whistles merrily through their ill-conditioned dwellings."

Some of the patients subjected to limb-amputation were located in habitations still more stunted and squalid than the cottage of the collier and iron-worker. In many rural villages and towns the poorer types of mechanics and their families all live in a house of a single room; and the country ploughman and labourer and their families are often similarly situated. In sending me a report of seven cases of amputation of the limbs, with one death,<sup>1</sup> Dr Lindsay of Lesmahagow remarks:—"The whole of the cases were in persons belonging to the lower classes, and were treated in small houses, most of them of *one* apartment." "The six amputations performed by me," writes Dr Jeffray of Ayton, "have all been in persons belonging to the lower classes, and all for injury. All the operations, with one exception, were performed in dwellings where there was only one apartment, into which all inquiring about the patient were freely admitted, and where there was no great ventilation. One of the operations—amputation of the leg—was performed in a hut upon the North British Railway, when in course of formation, and the end of the table upon which the patient was laid had to be brought to the door of the hut in order that I might have sufficient light." In a case in which Mr Bloxham of Hales-Owen was amputating the thigh, "in consequence of aneurism of the popliteal artery, which had been opened by a quack," the patient was living "in a den about six feet square, not high enough to stand upright in, and two farthing dips afforded the only light." The patient recovered. Describing the accommodation in a case of amputation of the thigh, Mr Cade of Spondon remarks, "The operation was performed in a miserable hovel, for it would be hardly fit to call such a place a house,—in a miserable bed; and yet the case did very well." In reporting to me three cases of primary limb-amputation—two of the thigh, and one of the leg—which all succeeded, Mr Girvan of Maybole says, "In each case there was but one apartment for the whole members of the family to live, cook, eat, and sleep in." Mr Balding of Rayston, in forwarding the results of two cases—one of them amputation of the leg, and the other of the thigh—strongly points out what the differences between healthy and unhealthy cottages may lead to:—"The two cases of amputation," says he, "were both performed in cottages. The case of amputation of the leg was in a dirty and unhealthy cottage, sur-

<sup>1</sup> The fatal case was in a case of thigh-amputation. "The operation," Dr Lindsay writes, "was undertaken with scarcely any hope of success. It was a case of compound fracture,—not a severe one,—which resulted in gangrene a few days after the accident, apparently from some defect of constitution. Although a line of demarcation had formed in the leg, there was great infiltration of the tissues upwards even into the pelvis."

rounded by every description of filth. There was no attempt at union in the wound, the flaps sloughed, and the patient died nine days after the operation. The other case, that of amputation of the thigh, was performed in a clean and healthily-situated cottage. The patient's recovery was more rapid than was ever witnessed in any hospital. At the expiration of a fortnight he may be described as having been almost well."

Dr Irving of Pitlochrie has performed amputation of the limbs in 12 cases, and makes an observation upon the houses in his Highland district, which seems to me of importance. The only case of the 12 that died was an old drunkard of 84 years of age. "Excepting this instance," Dr Irving writes, "I have lost no cases after any capital operations. The 12 amputations were all in the lower classes. Some of their houses were small and dark, but as the walls were badly built, and the roofs thatched, the ventilation was therefore good." Dr Irving believes that the introduction into Highland and other districts of the close slated instead of the open thatched roof, is proving unsanitary where the families are not yet educated up to the necessary amount of tidiness and cleanliness.

In addition to the occasionally wretched house accommodation of the patients, their beds were sometimes of the worst construction in a sanitary point of view, being made on the old plan of building them closely off, with an inclosure or box of wood all around, and alike on the sides and top. Dr Johnston writes me, that in the earlier years of his practice, and before becoming connected with the Montrose Hospital, he performed several limb-amputations in the country. "All the patients," he says, "belonged to the labouring class, and were treated in the obnoxious box-bed which is in universal use among this class in the rural parts of Forfar and Kincardineshire."<sup>1</sup>

In reporting to me 12 cases of amputation of the limbs which he has performed, Dr Hamilton of Dalry makes a remark, which is, I think, highly worthy of citation. "It has long," he states, "been my belief that the success of the treatment of amputation and of compound fractures was greater in private than in hospital practice, even when the comforts and surroundings were totally unequal to those of the Hospital. I believe," Dr Hamilton adds, "that *isolation has much to do with it.*" I doubt not that the segregation of the sick from the sick—every diseased man being a focus of more or less danger to the diseased around him—is a principle of no small moment and value.

<sup>1</sup> Of the 11 patients, 2 died from shock shortly after primary amputations, one being a woman of almost 80 years of age, with comminuted fracture of the leg and compound dislocation of the ankle; and the second a lunatic, in whom the arm was smashed and destroyed.

CHAPTER VI.—SEVERITY OF SOME OF THE CASES THAT  
RECOVERED.

It has been sometimes maintained that all the most severe and formidable cases, and classes of cases, of injury and disease among the country poor are more likely to be sent into hospitals than treated at home; and that this circumstance alone specially accounts for the higher hospital danger and mortality in limb-amputations.

The most dangerous class of amputations of the limbs consists of primary amputations required for injury; and the most perilous of all amputations in the continuity of the bones is amputation of the thigh for injuries inflicted by railways, mining, machinery, etc. In his very able work on Surgery, Professor Erichsen observes:—"It is more especially primary amputations of the lower extremities, and particularly those of the *thigh*, that are attended by very fatal results. Of the 46 cases of primary amputation of the thigh recorded by Malgaigne, 34 perished. And of 24 cases recorded by South, Lawrie, and Peacock as occurring at St Thomas's Hospital, the Glasgow Infirmary, and the Edinburgh Infirmary, every one proved fatal. This similarity of result," Mr Erichsen adds, "occurring in different institutions, shows clearly that this operation is one of the most fatal in surgery, and that the great mortality attending it is inherent to it, and not dependent upon local or accidental circumstances."

According, therefore, to the theory that the cases requiring the most formidable and fatal operations are generally, if not systematically, forwarded from the country into the city hospital, primary amputations of the thigh should be found in far greater numbers in the returns of large city hospitals than in rural practice. Is it so?

Among the 2098 cases of limb-amputations collated in Table I. from rural and provincial practice, there are 313 cases of primary amputation of the thigh, with 80 deaths; or very nearly 1 death in every 4 operated upon.

Among 2089 cases of limb-amputations collated in Table XI. (see the sequel) from eleven large and metropolitan hospitals, there are 304 cases of primary amputation of the thigh, with 196 deaths; or 1 death in every 1·5 operated upon.

The proportionate number, therefore, of primary amputations of the thigh, is thus as nearly as possible the same in country practice as in large hospital practice—being 14·8 per cent. of the whole in the first, and 14·5 per cent. of the whole in the last; but the mortality attendant upon the operation is more than *twice and a half* as high in large hospital practice as it is in country practice.

Injuries, indeed, so serious as to require such a grave operation as amputation of the thigh or leg ought, perhaps, as a general rule, not to be forwarded from the country into a city infirmary. Patients so damaged and shattered would have a far better chance of life if

they were operated upon and kept in a railway shed, or in a country hovel, than by being carried to a distance into the richest and best conducted hospital. Chance has sometimes preached this lesson. Thus Dr Carmichael of Burntisland—a town lying on the opposite side of the Forth, at a distance of some seven miles from the Edinburgh Infirmary—states to me that since he began to practise there, three years ago, he had sent 6 cases of severe injuries requiring amputation of the limbs to the Edinburgh Hospitals. All the 6 died. In the last case, however, which happened, the patient was a middle-aged man of not a very robust constitution, who received such very severe injuries of both legs that it was deemed utterly hopeless to attempt to carry him as far as Edinburgh. Dr Carmichael, consequently, retained the man in comparatively poor accommodation at Burntisland, and performed upon him the necessary double amputation of one thigh and the opposite leg. He made an excellent recovery.

We have already in Table II. entered 16 cases of compound amputations of the limbs that recovered in despite of the tremendous severity of the accidents and injuries that led to the dire necessity, in each of them, of a double amputation.

In some of the remarks forwarded to me along with the schedules, the severe and desperate character of the injuries requiring the primary amputations is incidentally alluded to. Thus, Dr Lawrence of Cumnock, who has performed 20 amputations of the limbs without a death—5 for disease, and 15 for injury—remarks, “About one-third of these cases were so bad that I thought it was *impossible* they could recover.” Six of his cases were amputations of the thigh.

Dr Cullen of Airdrie, who has performed, without a death, 10 primary amputations of the thigh, and 17 primary amputations of the leg, among an iron-working and colliery population, says that the deplorable severity of some of the mining injuries was probably much greater in the past than it will be in the future, in consequence of the protection now afforded to the men by the Mines’ Inspection Act. But accidents and mutilations of an appalling type still occur in some localities. Mr Davis of Aberdare, who has with his own hand performed 22 primary amputations of the thigh, and 23 primary amputations of the leg, adds that 7 of the thigh-amputations were for one terrific form of accident, viz., compound dislocation of the knee—an accident which seems to be the result, in his district, of the mode in which the workmen are in the habit, by applying their backs, of staying the loaded and descending trucks in the mines.

Various instances have been recounted to me of the desperate and complicated nature of some of the injuries from which the amputated patients recovered. As examples, let me cite from Dr Kirk of Bathgate, the two following illustrative cases of injury and recovery in miners. Whilst working in the pit, above half a ton



of solid rock fell upon one of these men. This enormous mass required to be broken up before the man could be removed from beneath it. He had the following series of injuries: 1. Fracture of the left thigh-bone; 2. Compound comminuted fracture of the right leg, for which amputation was performed below the knee-joint; 3. Dislocation of the right hip-joint; 4. Lacerated wound of the perineum, extending into the right iliac fossa; and, 5. Compound comminuted fracture of the metacarpal bones of the left hand. He had afterwards pyæmia, with tympanitis; and a large abscess formed over the dislocated thigh. Under the kind and able care of Dr Kirk, this patient recovered; was enabled to get about in three months; and now works in the pit every day. To quarry off the block of rock which fell upon him, required two or three hours' work on the part of his comrades; and he was subsequently removed from the pit-mouth in a cart to a room two miles distant. Dr Kirk further informs me that he treated shortly afterwards in the same room another miner from the same pit, upon whom a mass of rock had also fallen. It entirely comminuted and ground the bones of one knee-joint, so as to necessitate the amputation of the thigh; and his head and face were very severely injured. This miner was a debilitated man, advanced beyond fifty, addicted to hard drinking, and the subject of a chronic bronchitis. Yet notwithstanding his age and his weakness, his drunken habits, and his troublesome cough, he recovered rapidly, and without a drawback. Would these two poor fellows have had much or any chance of escape, if, instead of being treated at home, they had been carried away into a distant city hospital?

The preceding remarks on the severity of some of the cases that recovered, refer chiefly or entirely to primary amputations, or to those required for injuries or their results. They tend to show that these primary amputations in country practice were necessitated by as formidable injuries as could well be met with in hospital practice. But in the country, secondary amputations, or those for disease, are also in many instances necessitated by as unpromising morbid local lesions and morbid constitutional states as are met with in large hospitals. A few of the secondary amputations entered in Table I. had been, indeed, previously despaired of when the patients were the inmates of hospitals, and yet afterwards proved successful operations in the country. Thus, for example, in some notes on his amputations, Mr Breach of Aston-up-Thorpe observes:—"All the cases proved successful. One (a thigh-amputation) was turned out of the — Infirmary as incurable, the surgeon fearing to operate, as the patient appeared to be in the last stage of hectic, from ulceration of the cartilages of the knee-joints and caries of the femur. The patient begged of me to operate to relieve her of her extreme pain. I reluctantly yielded to her request. About the third or fourth day erysipelas of the stump took place. Betimes a ring of bone ex-

foliated, and she made henceforward a rapid recovery. She is now in robust health,—it being just nine years since the operation.” In speaking of another thigh-amputation, Mr Brookes of Shaldon observes :—“The patient was a sailor in the Royal Navy, and was brought home at his own request from — Hospital. The case was one of diseased knee, and the operation was performed with little hope of success. It was, however, the only chance, and all went on well.” Dr Corbett of Orsett writes me in relation to two thigh-amputations which he has successfully performed, that one of his cases was in a labouring man, aged 72, who “had been in the — Hospital for some months, and was discharged to die, as there was a difference of opinion as to the possibility of recovery if an operation was performed.” In reference to a case of amputation of the leg, Mr Hallett of Axminster remarks that “the operation on an old sailor was performed on account of caries of the os calcis, and exostosis of the lower end of the tibia and fibula, of many years’ standing. He had been sent to an hospital; but the surgeons declined operating, fearing that, as his health was such, he would sink under its effects. He, however, recovered without a single bad symptom, and lived in comfort for many years afterwards.”<sup>1</sup>

Occasionally country patients, by the time that they require to be the subjects of secondary or pathological amputations, are already so utterly sunk and debilitated as to be entirely incapable of being moved off to an hospital; and yet sometimes make good recoveries when the operation is had recourse to at home. Dr Pairman of Biggar has sent me reports of two cases, in regard to which he observes : “Both were in the humble ranks of life, and operated on by me because reduced to a condition of such extreme weakness that they could not be removed to an hospital. Both, however, recovered admirably. One of them was almost hopeless from prostration before the operation, and, as I think, would almost certainly have died in any hospital.”

The patient, before at last agreeing to amputation, may have lapsed down into the very lowest stage of weakness and almost of hopelessness—a result which, if I may judge from the remarks sent to me, not unfrequently occurs in country practice. Thus, Mr Lawrence of Mintlaw states, in reference to an amputation of the thigh for disease which was performed by him, that the patient “had long laboured under disease of the knee-joint, and was so

<sup>1</sup> In some of the amputations for disease, there was a remarkable succession of operations. Thus, Mr George of Keith, in commenting upon one of his cases of amputation of the leg for disease of the ankle-joint, remarks that the patient, a farm-servant aged 57, suffered a year afterwards so severely from affection of the knee-joint, that “it was necessary to remove the thigh about the middle. Eighteen months after the removal of the thigh, his right hand and wrist became diseased, for which he had the forearm amputated. Previously to the removal of any of his limbs, the operation of lithotomy was performed upon him in Elgin Hospital; and he died, three years after the last amputation, of disease of the bladder.”

weak and attenuated that he could *not* be moved even to a table for the operation; but his recovery was rapid, and he got very stout."

Several correspondents speak of the recovery of some of their patients in the country<sup>1</sup> from secondary amputations, as conditions that scarcely could have been realized if these same patients had been the inmates of city hospitals. Mr Haig of Airth, for example, in reporting to me several successful cases of amputation, remarks, in regard to three of his six secondary operations, "I feel certain that, owing to the great debility induced by the discharges from the knee and elbow joints, a satisfactory result could *not* have been looked for if the patients had been confined in the wards even of the best of hospitals." In reference to four cases of secondary amputation in his practice, in all of which the state of debility of his patients was complicated and extreme, and the cottage accommodation most defective, Mr Blackburn of Barnsley asserts, "All recovered; yet my own belief is, that every case would have died if removed to an hospital."

Many correspondents have casually, and yet so strongly, expressed in a similar spirit the results of their experience as to amputations and other operations succeeding much better in country than in hospital practice, that perhaps the collation of a few such opinions may be interesting.

#### CHAPTER VII.—OPINIONS AS TO AMPUTATIONS, ETC., SUCCEEDING BETTER IN PRIVATE COUNTRY THAN IN PUBLIC HOSPITAL PRACTICE.

There are various reasons why cases of disease or injury among the poor in the country requiring amputation are sent off to city hospitals. Enumerating these reasons, in a late letter to me, Dr Whitelaw of Kirkintilloch remarks:—"In my opinion, country patients are sent to the city hospital, *first*, by their relatives, because they cannot give them food at home; because they cannot pay for continued surgical attendance; because they have great faith in the head doctor, from whom there is no appeal; and because they know nothing of the perils of hospital pyæmia, erysipelas, etc.; *secondly*, they are sent by the country practitioners, because the accommodation, nursing, and resources at home are frequently quite inadequate; because once away to the hospital, the patient, probably a poor

<sup>1</sup> While this sheet was printing, Mr Harper of Holbeach has sent me the results of above 80 operations which he has performed in country practice, with a view of showing their relative safety in the country. Among these 12 were limb-amputations, 1 died; 4 were lithotomies, 1 died; and 7 were cases of strangulated hernia, 2 died. Only these four deaths occurred; and the recoveries included cases of lithotritry, of excision of tumours, of removal of portions of lower jaw, of amputation of mamma, extravasation of urine, amputations of the hand, fingers, etc., etc.

man, is off the doctor's mind, and his maintenance does not longer concern either his employers or the parochial board; and because, if the case turn out badly in the hospital, the tongues of the village gossips cannot reflect on the doctor, 'for the patient had the best of skill.' Yet it is my conviction," adds Dr Whitelaw, "that ordinary amputations and compound fractures would result in more numerous and more satisfactory recoveries, if treated in the country with fair skill, than if sent to a city hospital." "As surgeon," observes Mr Garman of Wednesbury, "to large iron-works and collieries, I may be perhaps allowed to add, that compound fractures and other formidable surgical lesions appear to do better in the squalid homes of the patients, although of course suffering great deprivation and inconvenience, than under hospital care. My partner and myself have long made it a rule not to send any formidable accidents to the hospital if possible. The cases we send are for the most part simple fractures, and chronic sequences of accidents." Mr Carter of Pewsey states: "All my cases of amputation occurred in my pauper practice, the patients being of the lowest class of an agricultural population. But my undoubted experience has ever been, that the poor recover much more readily at their own houses than from the best of treatment elsewhere." "I can give," avers Mr Wilson of Alton, "my testimony in favour of operations being performed among the poor at their own houses; and there are few cottages indeed in the south of England in which a free current of air may not be obtained." Dr Monckton of Rugeley has sent me a note of the results of 6 amputations and 80 various surgical operations which he has performed. "Among all these," he writes, "the primary amputation through the thigh is the only case which had a fatal result, whereas I remember being shocked as a student to see operations performed in a London hospital for comparatively small ailments or deformities, which were often followed speedily by a fatal result from pyæmia, erysipelas, etc.; and to this day I hear students remark upon the same unfavourable issue to small operations most ably performed by the first surgeons of the land." "Having," observes Mr Cann of Dawlish, "been house-surgeon at Guy's Hospital, London, I can, without hesitation, pronounce in favour of operations being done in private houses." "I have had," says Dr Guppy of Falmouth, "many compound fractures among our sailors and dock-labourers, and my opinion is that the mortality from the graver operations and injuries is *much* less in private and country practice than in hospitals." Mr Hardy of Byer's Green, Willington, in sending a report of a series of limb-amputations, writes: "I have been long of opinion that severe accidents in the country are more likely to do well than when they are sent to an hospital, and I have never hesitated to express this opinion; for, living in a colliery district, where severe injuries often occur, I have found them to do better in their own houses than when sent away to an

hospital, and consequently I have been very chary in even advising the removal of such parties. Most of the cases of amputation which I have recorded have been caused by railway accidents. All the patients suffered from shock, and the deaths recorded have been from that cause; none from symptoms of blood-poisoning." In the same spirit Dr Thomson of Motherwell observes, "My experience is against sending any case to hospital that can be treated at home. I have only sent for years past lodgers, or those having no house accommodation." "I have always," writes Dr Loudon of Hamilton, "studied to keep the patients in their own homes when their means would admit of it, and have only sent those cases to hospital when parties refuse to admit them, as in the case of lodgers."

I might easily multiply similar extracts, but it seems unnecessary. Let me add, however, one remark in relation to the fixed belief with many city and hospital surgeons, that almost all severe cases of injury and disease likely to require amputation are forwarded by the rural practitioner to the city hospital. The great mass of cases of country limb-amputations which I have collected, affords in itself a strong answer to this allegation. Besides, in distant districts the removal of severely injured or diseased patients for amputation to city hospitals is a matter of impossibility. And where the practice is possible, it is often not at all followed. From the medical gentlemen of Airdrie, for example, and its surrounding villages, situated within a few miles of the Royal Infirmary of Glasgow, I have received returns of about one hundred and fifty limb-amputations performed by them at their patients' own homes.

#### CHAPTER VIII.—EVIDENCE OF INCREASED SUCCESS IN AMPUTATIONS FROM INCREASED EXPERIENCE.

Out of the 2098 amputations of the thigh, leg, arm, and forearm, performed in private provincial and country practice, and entered in Table I., 226 of the patients died; or 1 in every 9·2, or 10·8 per cent. Of the 2098 amputations, 1382 were primary, traumatic, or performed for injuries or their results. Of these 1382 cases, 151 proved fatal; or 1 in 9 died, or 11 in the 100. On the other hand, 716 of the 2098 amputations were secondary, pathological, or for disease and its results; and of these 716 cases, 74 proved fatal; or 1 in every 9·6 died, or 10·3 in every 100.

Of the 374 gentlemen who have reported to me these 2098 cases, a large number have had little opportunity of becoming experienced by much practice in the performance of amputation. Many have only been called upon to have recourse to the amputating-knife once, twice, or thrice, in the whole course of their lives. But in all operations, the surgeon acquires accumulated dexterity and skill by the repetition of an operative proceeding which, like this,

involves a combination of manual and mental qualities. It is therefore natural to expect that those practitioners who have performed amputation with considerable frequency should be somewhat more successful in their results than those who have not had the same amount of actual experience. To test on this ground the relative success of the operation in the hands of those provincial and rural practitioners who had practised amputation comparatively seldom, with those who had practised it more frequently, I have taken out of Table I. the results of the operation as observable, *1st*, in the experience of those medical men who had performed amputation rarely, as only once, or twice, or at most under half-a-dozen times; *2dly*, in the experience of those medical men who had practised amputation six times or oftener; and, *3dly*, in the experience of those medical men who had used the amputating-knife twelve times or oftener. These analytical results appear to me of no small interest, as showing that, if the rural practitioner had as much experience as the Hospital surgeon, his present great success over the Hospital surgeon would be greater still; and his proportion of deaths from the major amputations would be even less than what the general Table shows—of 1 death in every 9 patients operated upon.

FIRST, In the columns of Table I. are contained the results of 629 limb-amputations, performed by 255 practitioners who have operated less than six times; 72 of them having amputated in 1 case only, 82 in 2 cases, 36 in 3 cases, etc.

The following summary shows the mortality among the individuals operated upon in these 629 amputations:—

Their total number of cases was 629; of deaths, 85; or 1 in every 7·4 died, or 13·5 in every 100.

Total number of amputations for injury, 401; of deaths, 53; or 1 in every 7·2 died, or 13·2 per cent.

Total number of amputations for disease, 228; of deaths, 32; or 1 in every 7·1 died, or 14 per cent.

*Mortality of the Four Major Amputations for Injuries and for Diseases among 255 Practitioners who have amputated less than six times.*

Thigh	cases, 193; deaths, 44; or 1 in 4·4; or 22·7 per cent.
Leg	„ 178; „ 32; or 1 in 5·5; or 18·0 „
Arm	„ 134; „ 8; or 1 in 16·7; or 6·0 „
Forearm	„ 124; „ 1; or 1 in 124; or 0·8 „

SECONDLY, I find in Table I. that 119 gentlemen practising in the country and provinces have had occasion to perform the major amputations of the limbs six times or oftener, with the following consequences:—

Total number of cases, 1469; of deaths, 141; or 1 in every 10·4 died, or 9·5 in every 100.

Total number of amputations for injury, 983; deaths, 100; or 1 in every 9·8 died, or 10·1 in every 100.

Total number of amputations for disease, 468; deaths, 41; or 1 in every 11·8 died, or 8·7 in every 100.

*Mortality of the Four Major Amputations for Injuries and for Diseases among 119 Practitioners who have amputated six times or oftener.*

Thigh cases,	476;	deaths,	79;	or 1 in	6·0;	or 16·5 per cent.
Leg	440;	„	50;	or 1 in	8·8;	or 11·3 „
Arm	299;	„	11;	or 1 in	27·1;	or 3·6 „
Forearm „	254;	„	1;	or 1 in	254;	or 0·4 „

THIRDLY, The proportion of successful amputations becomes greater still when we analyze the results of those practitioners who have operated twelve times or oftener. In Table I. are to be found 37 returns in which the number of amputations performed by one practitioner was twelve or upwards. These 37 practitioners have had occasion to perform the four major amputations of the limbs upon 821 patients, with the following results:—

Total number of cases, 821; of deaths, 67; or 1 in every 12·2 died, or 8·1 in every 100.

Total number of amputations for injury, 561; deaths, 46; or 1 in every 12·2 died, or 8·2 in every 100.

Total number of amputations for disease, 260; deaths, 21; or 1 in every 12·4, or 8 in every 100.

*Mortality of the Four Major Amputations for Injuries and for Diseases among 37 Practitioners who have operated twelve times or oftener.*

Thigh cases,	260;	deaths,	35;	or 1 in	7·4;	or 13·4 per cent.
Leg	250;	„	25;	or 1 in	10;	or 10·0 „
Arm	179;	„	6;	or 1 in	29·8;	or 3·3 „
Forearm „	132;	„	1;	or 1 in	132;	or 0·7 „

The preceding three summaries of results show—

1. That, up to a certain point at least, limb-amputations become more and more successful in the hands of rural and provincial practitioners in accordance with the experience which they have had of the operation.

2. That hence the country limb-amputations entered in Table I. would, in all probability, have shown a still higher rate of success than they do present, if they had been all performed by men who—

<sup>1</sup> There are only 2 deaths under this heading in the whole Tables, 1 of which happens to be in this class, and thus alters the proportion so as to make it look worse than in the other Tables.

like city hospital surgeons—were by experience accustomed to the operation. And,

3. That the three successive summaries show how, with increased experience, there occurs not merely an increased scale of success in limb-amputations taken as a whole, but also in the different limb-amputations taken individually. Thus, for example, amputations of the thigh are lost among the three classes of practitioners in correspondence with the amount of their experience in the following proportions: 22·7 per cent.; 16·5 per cent.; 13·4 per cent.; and so on with regard to the other special amputations.

#### CHAPTER IX.—ON THE RESULTS OF LIMB-AMPUTATIONS IN PRIVATE PRACTICE IN OTHER COUNTRIES.

The statistics of limb-amputations in country practice collated in Chapter II. are altogether derived from the experience of surgeons living in the rural and provincial parts of England, Wales, and Scotland. No statistics of a similar kind have, so far as I know, been collected previously in Great Britain or elsewhere. But, a short time ago, I sent to my friend, Dr Nicolaysen of Christiania, a copy of the printed schedule which I had used here for collecting cases and their results; and he immediately began a series of similar inquiries regarding the danger and death-rate of amputations in Norway. The following tables, drawn up by himself, show the result of his investigations; and these are important in one respect. As far as they go, they confirm the conclusion that the average death-rate, after amputation of the limbs in private country practice, is about 1 in 9; and they show that the mortality is the same in Norway as in Great Britain.

##### *Results of 82 Amputations of the Thigh, Leg, Arm, and Forearm, in Private Practice in Norway.*

Thigh	cases, 29; deaths, 5; or 1 in 5·8; or 17·24 per cent.
Leg	„ 30; „ 2; or 1 in 15; or 6·6 „
Arm	„ 8; „ 1; or 1 in 8; or 12·5 „
Forearm	„ 15; „ 1; or 1 in 15; or 6·6 „

Total cases, 82; deaths, 9; or 1 in 9·0; or 10·9 per cent.

Of these amputations there were, *Primary or for Injury*,—

Thigh	cases, 8; deaths, 2; or 1 in 4; or 25·0 per cent.
Leg	„ 9; „ 0
Arm	„ 6; „ 1; or 1 in 6; or 16·6 „
Forearm	„ 11; „ 1; or 1 in 11; or 9·1 „

Total cases 34; deaths, 4; or 1 in 8·5; or 11·7 per cent.



*Secondary or for Disease.*

Thigh	cases, 21; deaths, 3; or 1 in 7; or 14·3 per cent.
Leg	" 21; " 2; or 1 in 10·5; or 9·5 "
Arm	" 2 } no deaths.
Forearm	" 4 }

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Total cases, 48; deaths, 5; or 1 in 9·6; or 10·4 per cent.

Seeing that limb-amputations are fatal in rural and provincial private practice in the proportion of 1 in 9, or less, let us next inquire what, on the contrary, is their death-rate in large and metropolitan hospitals.

#### CHAPTER X.—MORTALITY OF THE FOUR AMPUTATIONS OF THE THIGH, LEG, ARM, AND FOREARM, IN LARGE AND METROPOLITAN HOSPITALS.

Formerly, when writing of the relative mortality of the four major amputations of the limbs in rural practice and in hospital practice, I ventured to lay it down as a proposition, that these amputations were about three times more fatal in our large and metropolitan hospitals than they were in the country; for while they were fatal in country and provincial private practice in the proportion of 1 in every 9 operated upon, they were fatal in the large hospitals of Edinburgh, Glasgow, and London, in the proportion of 1 in every 3 operated upon. (See *Medical Gazette* for January 16, 1869.)

To elucidate this important proposition, we shall therefore now investigate the mortality of these four amputations in the largest hospitals in Great Britain; and in doing so I shall use, as far as I have been able to procure them, the latest returns from these institutions. Our seven largest hospitals in this country are the Royal Infirmaries of Edinburgh and Glasgow; and in London, Guy's, St Bartholomew's, St George's, the London, and the Middlesex Hospitals. Each of these institutions has upwards of 300 beds; most of them about 500. St Thomas's Hospital when rebuilt will, I believe, be still larger. At present, in its temporary quarters, it has only about 200 beds. As the problem refers to metropolitan hospitals, we shall include the statistics of other smaller London hospitals, as King's College, St Mary's, the Westminster, the Royal Free Hospital, etc.

As the whole of the present inquiry has originated in questions connected with the rebuilding of the Edinburgh Hospital, let us begin with it.

## I.—ROYAL INFIRMARY OF EDINBURGH.

This hospital contains 519 beds.<sup>1</sup> The mortality in its amputation cases has, at different and distant dates, been published by Dr Monro, Dr Reid, Dr Peacock, and others. Dr Fenwick of London, when writing on the mortality of amputations in 1848, states the number of cases of the major amputations performed in the Edinburgh Infirmary for  $3\frac{1}{2}$  years to be slightly more than 1 in every 2 (or more correctly 1 in 1·96). For the following Table of its amputation statistics during the last eight years, I am indebted to Mr M'Dougall, the highly esteemed Superintendent of the hospital, who drew it up with the permission of the Managers :—

TABLE IV.—*Result of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in the Royal Infirmary, Edinburgh, from 1859 to 1868 inclusive.*<sup>2</sup>

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1859-60	3	3	7	1	0	0	0	0	13	1	0	0	0	0	1	0
1860-61	4	3	5	1	3	1	4	0	9	1	3	0	1	0	0	0
1861-62	10	7	7	5	2	0	3	0	19	3	2	0	1	0	2	0
1862-63	4	4	10	5	1	0	7	0	12	6	5	1	1	1	2	1
1863-64	6	3	6	3	3	3	2	0	21	10	5	3	2	0	5	2
1864-65	5	5	3	2	3	1	7	2	14	4	3	2	1	1	5	4
1865-66	12	8	5	4	4	3	3	1	11	3	5	1	0	0	2	0
1866-67	10	9	8	3	4	3	8	1	14	10	1	0	1	1	1	0
1867-68	11	6	7	5	1	1	5	1	21	10	4	2	0	0	1	0
Total,	65	48	58	29	21	12	39	5	134	48	28	9	7	3	19	7
Mortality per cent.	73·8		50·0		57·1		12·8		35·8		32·1		42·8		36·8	
Or proportionally 1 in	1·3		2·0		1·7		7·8		2·8		3·1		2·3		2·7	

Total number of cases, 371; of deaths, 161; or 1 in every 2·3 died, or 43·3 in every 100.

Total number of amputations for injury, 183; deaths, 94; or 1 in every 2·0 died, or 51·3 in every 100.

Total number of amputations for disease, 188; deaths, 67; or 1 in every 2·8, or 35·6 in every 100.

If we combine together the amputations for injury and for disease,

<sup>1</sup> In these figures relative to the number of beds in different hospitals, I have chiefly followed the excellent official report of Dr Bristowe and Mr Holmes (see Sixth Report of the Medical Officer of the Privy Council), and Mr Churchill's Medical Directory.

<sup>2</sup> Ten fatal double amputations through the continuity of the bones alluded to previously in Chapter III. are not included.

the mortality from the different individual amputations during the above period in the Edinburgh Infirmary was as follows:—

*Mortality of the Individual Amputations.*

Thigh cases, 199; deaths, 96; or 1 in 2·1; or 47·2 per cent.  
 Leg „ 86; „ 38; or 1 in 2·2; or 44·2 „  
 Arm „ 28; „ 15; or 1 in 1·8; or 53·6 „  
 Forearm „ 58; „ 12; or 1 in 4·8; or 20·7 „

II. ROYAL INFIRMARY OF GLASGOW.

This great institution contains from 500 to 600 beds. The statistics of the amputations in the Glasgow Royal Infirmary at different periods have been published by Drs Lawrie, Steele, M'Ghie, Watson, and others. The following Table includes the statistics of the limb-amputations in the hospital from 1850 to 1868. These returns are taken from the published yearly reports of the hospital, for access to a collection of which I am indebted to the excellent Registrar of the hospital, Dr Thomas:—

TABLE V.—*Result of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in the Royal Infirmary, Glasgow, from 1847 to 1868 inclusive.*

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1850	1	1	3	1	2	1	5	0	5	4	7	4	2	1	0	0
1851	1	0	1	0	0	0	1	0	6	5	8	3	0	0	0	0
1852	0	0	1	0	2	0	5	0	5	2	6	3	1	0	4	1
1853	0	0	4	1	7	1	2	0	16	7	10	4	5	2	2	0
1854	0	0	4	2	3	3	1	0	10	7	5	0	4	1	3	0
1855	3	1	2	2	2	1	2	0	5	3	10	1	0	0	1	0
1856	2	2	4	1	2	2	2	1	11	5	1	0	0	0	0	0
1857	4	3	5	3	2	1	3	2	8	2	1	1	1	0	0	0
1858	4	2	5	4	1	0	4	1	8	5	3	1	0	0	2	0
1859	5	4	7	5	6	2	5	0	7	1	2	0	0	0	0	0
1860	3	0	4	3	9	1	4	0	8	2	3	2	3	0	0	0
1861	7	4	9	6	3	2	6	2	14	7	6	3	2	1	2	0
1862	12	4	9	2	6	2	3	0	7	0	2	0	3	0	1	0
1863	13	10	3	1	6	2	5	1	14	4	3	0	0	0	0	0
1864	7	4	9	3	9	2	8	2	9	3	4	1	1	1	0	0
1865	8	6	7	6	14	2	6	0	12	4	1	0	0	0	0	0
1866	18	12	7	4	12	6	2	0	4	1	5	3	0	0	3	0
1867	3	1	8	5	6	5	2	0	13	2	3	0	0	0	0	0
1868	9	6	1	1	9	5	0	0	15	4	2	1	1	0	1	0
Total.	100	60	93	50	101	38	66	9	177	68	82	27	23	6	19	1
Mortality per cent.	60·0		53·7		37·6		13·6		38·4		32·9		26·0		5·2	
Or 1 in	1·6		1·8		2·6		7·3		2·6		3·0		3·8		19·0	

Total number of cases, 661 ; of deaths, 259. Hence 1 in every 2·5 died, or 39·1 in every 100.

Total number of amputations for injury, 360 ; deaths, 157 ; or 1 in every 2·3 died, or 43·6 in every 100.

Total number of amputations for disease, 301 ; deaths, 102 ; or 1 in every 2·9 died, or 33·8 in every 100.

*Mortality of the Four Major Amputations, combining together Operations for Injuries and Operations for Diseases.*

Thigh cases, 277 ; deaths, 128 ; or 1 in 2·1 ; or 46·2 per cent.  
 Leg " 175 ; " 77 ; or 1 in 2·2 ; or 44·0 "  
 Arm " 124 ; " 44 ; or 1 in 2·8 ; or 35·4 "  
 Forearm " 85 ; " 10 ; or 1 in 8·5 ; or 11·7 "

III. ST BARTHOLOMEW'S HOSPITAL, LONDON.

Of the London hospitals, this is the oldest in its foundation, and has always been held in high esteem. It contains 650 beds. I am obliged to Mr Alfred Willett, the Surgical Registrar to the hospital, for copies of the official statistical reports, and for the following Table of the limb-amputations performed there since 1863, with their results.

TABLE VI.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in St Bartholomew's Hospital, London, from 1863 to 1868 inclusive.*

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1863	7	5	10	4	3	1	4	2	22	10	5	0	1	0	1	0
1864	4	3	7	5	10	3	3	0	21	8	10	4	1	0	3	0
1865	7	3	4	4	2	0	5	0	14	7	14	6	5	0	3	0
1866	4	2	6	1	3	0	2	0	5	1	3	2	2	0	1	0
1867	2	1	4	1	1	0	2	0	9	4	2	1	3	0	1	0
1868	1	1	8	6	2	0	7	1	13	7	10	3	3	0	2	0
Total,	25	15	39	21	21	4	23	3	84	37	44	16	15	0	11	0
Mortality per cent.	60·0		54·0		19		13·0		44·0		36·3					
Or proportionally 1 in	1·6		1·8		5·2		7·6		2·2		2·7					

Total number of cases, 262 ; of deaths, 96 ; or 1 in every 2·7, or 36·6 in every 100.

Total number of amputations for injury, 108 ; of deaths, 43 ; or 1 in every 2·5, or 40 in every 100.

Total number of amputations for disease, 154; of deaths, 53; or 1 in every 2·9, or 34·4 in every 100.

If we combine together the amputations for injury and for disease, the mortality from the individual amputations during the above period in St Bartholomew's Hospital is as follows:—

*Mortality from the Individual Amputations.*

Thigh cases, 109; deaths, 52; or 1 in 2·1, or 47·7 per cent.  
 Leg       "   83;       "   37; or 1 in 2·2, or 44·5       "  
 Arm       "   36;       "   4; or 1 in 9, or 11·1       "  
 Forearm   "   34;       "   3; or 1 in 11, or 8·8       "

IV. THE LONDON HOSPITAL, WHITECHAPEL.

The London Hospital is, according to Dr Bristowe and Mr Holmes, "the greatest surgical institution in the metropolis." It contains 500 beds, of which 350 are devoted to surgical cases. For the amputation returns for the year 1862 I am indebted to the report of Dr Bristowe and Mr Holmes; and for the years 1863, 4, 5, and 6 to the summaries given in the four published volumes of the "Clinical Lectures and Reports" of the Hospital. Those of the last two years, 1867–8, have been furnished me by Mr Jonathan Hutchison, Surgeon to the Hospital, and Lecturer on Surgery at its Medical School.

TABLE VII.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in the London Hospital, from 1862 to 1868 inclusive.*

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1862	4	2	14	9	7	5	0	0	9	3	1	1	1	0	0	0
1863	4	4	7	5	6	3	0	0	5	1	5	0	0	0	3	0
1864	9	8	5	5	5	3	3	0	7	3	4	2	0	0	1	1
1865	9	7	7	6	4	1	0	0	11	6	3	2	0	0	0	0
1866	5	2	4	3	6	2	3	0	9	4	2	2	0	0	0	0
1867	3	3	7	2	2	1	2	0	15	4	3	1	1	0	0	0
1868	4	2	1	0	1	0	2	0	12	2	4	1	3	0	1	0
Total,	38	28	45	30	31	15	10	0	68	23	22	9	5	0	5	1
Mortality per cent.	73·6		66·6		48·4				33·8		41				20	
Or proportionally 1 in	1·3		1·5		2				2·9		2·4				5	

Total number of cases, 224; of deaths, 106; or 1 in every 2·1, or 47·3 in every 100.

Total number of amputations for injury, 124; of deaths, 73; or 1 in every 1·7, or 58·8 in every 100.

Total number of amputations for disease, 100; of deaths, 33; or 1 in every 3, or 33 in every 100.

If we combine together the amputations for injury and for disease, the mortality from the individual amputations in the London Hospital is as follows:—

*Mortality of Individual Amputations.*

Thigh	cases, 106; deaths, 51; or 1 in 2·0; or 48·1 per cent.
Leg	„ 67; „ 39; or 1 in 1·7; or 58·2 „
Arm	„ 36; „ 15; or 1 in 2·4; or 41·6 „
Forearm	„ 15; „ 1; or 1 in 15; or 6·6 „

V. GUY'S HOSPITAL, LONDON.

This institution can make up 580 beds. My friend, Dr Steele, the very able Superintendent of the hospital, has for many years past kept up, among other things, its Statistical Register with most exemplary care and accuracy. I am under obligations to him for the data in the following Table:—

TABLE VIII.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in Guy's Hospital, London, from 1861 to 1868 inclusive.*

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1861	6	2	2	0	6	2	0	0	8	2	6	0	1	1	3	1
1862	7	3	8	4	1	0	4	0	7	4	6	1	2	0	0	0
1863	7	4	4	3	3	0	0	0	12	4	10	2	1	0	0	0
1864	5	4	11	6	1	1	1	1	11	4	4	1	1	1	0	0
1865	7	5	12	6	4	2	1	1	7	4	6	1	3	1	2	1
1866	4	2	8	6	5	2	3	1	10	1	6	1	1	1	1	0
1867	5	4	8	2	9	3	2	1	14	5	9	3	3	1	1	0
1868	5	2	0	0	2	2	4	2	14	3	2	0	1	0	1	0
Total,	46	26	53	27	31	12	15	6	83	27	49	9	13	5	8	2
Mortality per cent.	56·5		51		38·7		40		32·5		18		38·4		25	
Or proportionally 1 in	1·8		1·9		2·6		2·5		3		5·4		2·6		4	

Total number of cases, 298; of deaths, 114; or 1 in every 2·6, or 38·2 in every 100.

Total number of amputations for injury, 145; of deaths, 71; or 1 in every 2, or 49 in every 100.

Total number of amputations for disease, 153; of deaths, 43; or 1 in every 3·5, or 28 in every 100.

If we combine together the amputations for injury and for disease, the mortality from the individual amputations in Guy's Hospital is as follows:—

*Mortality of the Individual Amputations.*

Thigh	cases, 129; deaths, 53; or 1 in 2·4; or 41·0 per cent.
Leg	„ 102; „ 36; or 1 in 2·8; or 35·3 „
Arm	„ 44; „ 17; or 1 in 2·6; or 38·6 „
Forearm	„ 23; „ 8; or 1 in 2·8; or 34·7 „

VI. ST GEORGE'S HOSPITAL, LONDON.

This hospital contains 350 beds; 200 of which are set aside for surgical cases. Like all the large London hospitals, the edifice consists of four flats or stories. For the following data, in regard to the limb-amputations performed in St George's during the last five years, I stand indebted to the kindness of Mr Leigh, Registrar to the hospital.

TABLE IX.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in St George's Hospital, London, from 1864 to 1868.*

Year.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
1864	1	0	4	0	0	0	1	0	7	2	7	2	0	0	2	0
1865	0	0	0	0	4	2	1	0	12	4	7	2	4	0	0	0
1866	3	2	0	0	0	0	0	0	13	7	13	3	1	1	0	0
1867	0	0	1	0	1	0	0	0	11	7	8	2	2	2	1	0
1868	1	1	3	2	2	2	0	0	11	5	1	1	1	1	3	1
Total,	5	3	8	2	7	4	2	0	54	25	36	10	8	4	6	1
Mortality per cent.	60		25		57				46·3		27·7		50		16·6	
Or proportionally 1 in	1·6		4		1·8				2·1		3·6		2		6	

Total number of cases, 126; of deaths, 49; or 1 in every 2·5, or 38·8 in every 100.

Total number of amputations for injury, 22; of deaths, 9; or 1 in every 2·4, or 41 in every 100.

Total number of amputations for disease, 104; of deaths, 40; or 1 in every 2·6, or 38·4 in every 100.

If we combine together the amputations for injury and for dis-

ease, the mortality from the individual amputations in St George's Hospital is as follows:—

*Mortality of the Individual Amputations.*

Thigh cases, 59; deaths, 28; or 1 in 2·1; or 47·4 per cent.  
 Leg „ 44; „ 12; or 1 in 3·6; or 27·2 „  
 Arm „ 15; „ 8; or 1 in 1·8; or 53·3 „  
 Forearm „ 8; „ 1; or 1 in 8; or 12·5 „

VII. RESULTS OF LIMB-AMPUTATIONS IN NINE METROPOLITAN HOSPITALS.

I have been kindly furnished by Mr Arnott, Mr Bell, Mr Murphy, Mr Holt, and Dr Black, with the amputation statistics of five other London hospitals, in addition to those of the four chief metropolitan hospitals adduced in the four preceding Tables. But as these five hospitals are all smaller, and hence their returns not so important, nor in some respects so complete or continuous, it is unnecessary perhaps to print them at length. In the succeeding Table, therefore, I will take the liberty of conjoining them and the four preceding hospital returns—so as thus to have a general and connected view of the mortality attendant upon limb-amputations in these nine metropolitan hospitals, taken either individually or as a whole.

TABLE X.—*Latest Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in Nine London Hospitals.*

Name of Hospital.	Years of Observation.	For Injury.								For Disease.							
		THIGH.		LEG.		ARM.		FORE-ARM.		THIGH.		LEG.		ARM.		FORE-ARM.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
St Bartholomew's	1863-68	25	15	39	21	21	4	23	3	84	37	44	16	15	0	11	0
St George's . .	1864-68	5	3	8	2	7	4	2	0	54	25	36	10	8	4	6	1
Guy's . . . .	1861-68	44	26	53	27	30	12	15	6	83	27	49	9	13	5	5	2
London . . .	1862-68	38	28	45	30	31	15	10	0	68	23	22	9	5	0	5	1
Middlesex . .	1867-68	1	0	4	3	1	1	0	0	0	0	0	0	1	1	1	1
King's College .	1863-68	1	1	1	1	0	0	1	0	14	5	5	1	1	1	4	2
Royal Free . .	1862-68	9	6	23	15	6	2	8	1	6	1	2	0	1	1	1	0
Westminster .	1861-67	14	9	5	3	0	0	0	0	5	4	14	7	4	1	3	0
St Mary's . .	1868	2	0	1	0	1	0	5	1	6	1	1	1	0	0	1	0
Total		139	88	179	102	97	38	64	11	320	123	173	53	48	13	37	7
Mortality per cent. . .		63·3		57		39·1		17·1		38·4		35·7		27·0		18·9	
Or proportionally 1 in .		1·6		1·7		2·5		5·8		2·6		3·2		3·7		5·2	

Total number of cases, 1057; of deaths, 435; or 1 in every 2·4 died, or 41·1 in every 100.



Total number of amputations for injury, 479; deaths, 239; or 1 in every 2·0 died, or 50 in every 100.

Total number of amputations for disease, 578; deaths, 196; or 1 in every 2·9 died, or 33·9 in every 100.

If we combine together the amputations for injury and for disease, the mortality from the individual amputations in the above-mentioned London hospitals was as follows:—

*Mortality of the Individual Amputations.*

Thigh cases, 459; deaths, 211; or 1 in 2·1; or 46·0 per cent.  
 Leg     "   352;     "   155; or 1 in 2·2; or 44·0     "  
 Arm     "   145;     "   51; or 1 in 2·8; or 35·1     "  
 Forearm   "   101;     "   18; or 1 in 5·5; or 17·8     "

VIII. ELEVEN LARGE AND METROPOLITAN BRITISH HOSPITALS.

If we throw together into one table the data spread over the preceding seven tables, including together the amputation statistics of the Edinburgh and Glasgow Infirmarys, and of nine of the leading London Hospitals, the result is as follows:—

TABLE XI.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in Eleven Large and Metropolitan Hospitals; all amputations through the joints being excluded.*

Hospitals.	For Injury.								For Disease.							
	Thigh.		Leg.		Arm.		Fore-arm.		Thigh.		Leg.		Arm.		Fore-arm.	
	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Edinburgh Infirmary	65	48	58	29	21	12	39	5	134	48	28	9	7	3	19	7
Glasgow Infirmary	100	60	93	50	101	38	66	9	177	68	82	27	23	6	19	1
Nine Metropolitan Hospitals . . .	139	88	179	102	97	38	64	11	320	123	173	53	48	13	37	7
Total . . .	304	196	330	181	219	88	169	25	631	239	283	89	78	22	75	15
Mortality per cent. .	64·4		54·8		40·1		14·8		37·8		31·4		28·2		20	
Or proportionally 1 in	1·5		1·8		2·5		6·7		2·6		3·2		3·5		5	

Total number of cases, 2089; of deaths, 855; or 1 in 2·4, or 41 per cent.

Total number of amputations for injury, 1022; of deaths, 490; or 1 in 2·1, or 48 per cent.

Total number of amputations for disease, 1067; of deaths, 365; or 1 in 2·9, or 34·2 per cent.

*Mortality of Individual Amputations.*

Thigh	cases, 935 ; deaths, 435 ; or 1 in 2.1, or 46.5 per cent.
Leg	" 613 ; " 270 ; or 1 in 2.2, or 44.0 "
Arm	" 297 ; " 110 ; or 1 in 2.7, or 37.0 "
Forearm	" 244 ; " 40 ; or 1 in 6.0, or 16.4 "

*Mortality from the Amputations for Injury in the Edinburgh and Glasgow Infirmarys, and in Nine London Hospitals.*

Thigh	cases, 304 ; deaths, 196 ; or 1 in 1.5, or 64.4 per cent.
Leg	" 330 ; " 181 ; or 1 in 1.8, or 54.8 "
Arm	" 219 ; " 88 ; or 1 in 2.3, or 40.1 "
Forearm	" 169 ; " 25 ; or 1 in 6.7, or 14.7 "

*Mortality from the Amputations for Disease in the same Hospitals.*

Thigh	cases, 631 ; deaths, 239 ; or 1 in 2.6, or 37.8 per cent.
Leg	" 283 ; " 89 ; or 1 in 3.1, or 31.4 "
Arm	" 78 ; " 22 ; or 1 in 3.5, or 28.2 "
Forearm	" 75 ; " 15 ; or 1 in 5.0, or 20.0 "

CHAPTER XI.—THE PROPORTIONATE DEATH-RATE AND THE EXCESS OF MORTALITY OF LIMB-AMPUTATIONS IN LARGE AND METROPOLITAN HOSPITALS, AS COMPARED WITH COUNTRY PRACTICE.

The total number of limb-amputations collected from private country and provincial practice contained in Table I. amounts to 2098. On counting up the limb-amputations collected from eleven large and metropolitan hospitals, and contained in Table XI., the total number happens accidentally to be very nearly the same, for it amounts to 2089.

The whole collected number operated upon is thus nearly similar in hospital practice and in rural practice. But the results as to the relative number of lives lost in these two types or places of practice is immensely different.

After the 2098 limb-amputations in the country, 226 of the patients died. After the 2089 limb-amputations in eleven large and metropolitan hospitals, 855 of the patients died.

The mortality after limb-amputations in the country is thus 1 in 9.2 (see Chapter II.), and after limb-amputations in large and metropolitan hospitals 1 in 2.4 (see Chapter X.). Hence the number that die after these operations is in such hospital practice, when compared with rural practice, nearly FOUR TIMES GREATER.

But the experienced country surgeon loses—as we have seen in Chapter VIII.—only 1 in every 12.4 of his patients upon whom he performs limb-amputation. Hence the experienced country surgeon operating upon his patients in poor cottages and villages is—as com-

pared with the experienced city surgeon, operating upon his patients in rich and magnificent hospitals—**FIVE TIMES MORE SUCCESSFUL.**

In some minor amputations—and hence, I believe, in other minor operations also—the contrast is still more marked between the success of amputation in country practice and in the practice of large hospitals. In country practice, after amputation of the forearm, 2 died out of 377 cases, or 1 in every 188 operated on. In eleven large and metropolitan hospitals, out of 244 cases of amputation of the forearm, 40 died, or 1 in every 6 operated on. Hence, according to these data, the death-rate in hospital practice was, as compared with the death-rate in rural practice in this individual operation, **THIRTY TIMES GREATER.**

The tremendous differences between the two practices may, perhaps, be more pointedly and simply stated thus:—

Out of **2089** amputations in hospital practice, **855** died ;

Out of **2098** amputations in country practice, **226** died ;

*Giving an excess to hospital practice of **629** deaths.*

This excess, in about 2100 limb-amputations, of 629 deaths in hospital practice as compared with rural practice—in our palatial hospitals as compared with our rural villages and cottages—in large wards as compared with isolated rooms—is certainly much greater and more pronounced than I myself expected when I began the present inquiry. But must the calling of this dismal death-roll still go on unchallenged and unchecked? Shall this pitiless and deliberate sacrifice of human life to conditions which are more or less preventable, be continued or arrested? Do not these terrible figures plead eloquently and clamantly for a revision and reform of our existing hospital system?





# HOSPITALISM:

## ITS EFFECTS

ON

THE RESULTS OF SURGICAL OPERATIONS,  
ETC.

BY

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## PART III.

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# HOSPITALISM AND ITS EFFECTS.

## PART III.

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### CHAPTER XII.—SOME COMPARISONS, ETC., BETWEEN THE LIMB-AMPUTATIONS IN COUNTRY PRACTICE AND IN THE PRACTICE OF LARGE AND METROPOLITAN HOSPITALS.

IN comparing the mortality of the four major amputations of the limbs in large and metropolitan hospitals and in private country practice, one or two points of difference deserve to be pointed out before we proceed to the consideration of the statistics of Provincial British Hospitals of different sizes.

1. *There is a much larger proportion of primary amputations in the country amputation returns than in the hospital returns.*—Of the 2089 metropolitan and large hospital amputations tabulated in Chapter X., 1022 only were primary, or nearly one-half of the whole. Of the 2098 country amputations reported in Table I., 1384 were primary, or nearly two in every three. In other words, there is a surplus of 364 primary amputations in the country returns as compared with the large and metropolitan hospital returns. But amputations for injury are much more dangerous and fatal in their results than amputations for disease. In counting up the items in favour of the success of the hospital returns and against the success of the country returns, this point must be allowed to have due weight; and it ought to have much increased the country mortality against the hospital mortality, if other things had been equal. In other points there is an advantage of the contrary kind against the hospital and in favour of the country amputations. For example:—

2. *The hospital amputations contain a greater list of amputations of the lower extremities than the country returns.*—Of the 2098 country amputations, 1287 were amputations of the lower extremity, and 811 were amputations of the upper extremity. Of the 2089 hospital amputations, 1548 were amputations of the lower extremity, an



541 were amputations of the upper extremity. But the operation is much more fatal in the thigh and leg than in the arm and forearm. In the returns of the eleven large and metropolitan hospitals included in Table XI. the amputations of the lower extremity proved fatal in 45 per cent., the amputations of the upper extremity in 28 per cent. As already pointed out in Chapter III., the greater number of amputations of the forearm and arm in country practice is owing to the greater frequency of the accidents to which men are exposed in country life from gunshot wounds, and from the injuries produced by the unguarded thrashing-machine of the agriculturist. In the country returns there are 811 amputations of the upper extremity reported; in the hospital returns 541 amputations of the upper extremity are given. There is a slightly larger number of the most dangerous amputation of all—viz., of primary amputation of the thigh—given in the 2098 country than in the 2089 hospital amputations; but the latter contains, for reasons given elsewhere (see *Lancet* for 16th October), a greater number of thigh amputations for disease;—though this operation for this cause is, when performed, nearly three times more successful in country than in hospital practice.

I have also elsewhere pointed out at length (see a series of "Propositions on Hospitalism," in the *Lancet* for August, September, etc.), that with regard to the preceding 2098 country and 2089 hospital limb-amputations, they give ample evidence to this effect:—1. That limb-amputations in country practice are far more successful than in city or metropolitan hospital practice, both when taken as a whole, and still more so when the amputations are taken singly and individually; 2. That the contrast between the death rates in the two kinds or sites of practice—the country and the hospital—is proportionally more evident and pronounced in the slighter than in the greater amputations of the limbs; 3. That the vast differences between the death-rates of amputation in hospital practice and in single rooms in country practice are not accountable for, either by the state of the patients at the time of operating, or by the relative severity of the injuries or diseases demanding the operation; 4. That more patients sink under "shock" in country than in hospital practice; 5. That the main or leading cause of death in hospital as compared with country amputations is pyæmia or surgical fever; etc., etc.

But, without here entering further into these points of comparison between country amputations and those performed in large and metropolitan hospitals, let us proceed to another branch of our inquiry.

### CHAPTER XIII.—MORTALITY FROM LIMB-AMPUTATIONS IN THE PROVINCIAL HOSPITALS OF GREAT BRITAIN.

With the view of following out these inquiries as to the death-rate of limb-amputations under different conditions, I have tried to

collect statistics on the subject from the Provincial Hospitals of Great Britain. For it seemed important in relation to some points in the investigation to be able to contrast the results of amputations in our more limited provincial hospitals with the results of the same operations in our large and metropolis hospitals, on the one hand, and with their results in private country practice on the other hand. Besides, the inquiry promised to offer the most satisfactory kind of solution that could be obtained to the question as to the size of hospitals influencing or not, as a general law, their degree of salubrity or their degree of mortality.

The following was the form of schedule sent out to the different provincial hospitals of Great Britain, with the hope of procuring a return of the cases in which the four major amputations of the limbs had been performed in them in the continuity of the bones:—

*“Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in the Hospital from 1862 to .  
(Amputations through the Joints are not to be included.)*

Year.	FOR INJURY.								FOR DISEASE.							
	Thigh.		Leg.		Arm.		Forearm.		Thigh.		Leg.		Arm.		Forearm.	
	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.	No. of Cases.	Deaths.
18																
18																
18																
18																
18																
18																
18																
Total																

Signature, \_\_\_\_\_

Residence, \_\_\_\_\_

Date, \_\_\_\_\_

REMARKS.”

I asked only for the cases from 1862 onwards, partly because I was desirous of procuring the latest returns; and partly because many of the returns from these hospitals had been already published up to that year, or even inclusive of it, in the elaborate official reports drawn up by Dr Bristowe and Mr Holmes for the Medical Officer of the Privy Council.<sup>1</sup> One or two hospitals furnished me with returns from an earlier year, which I have, of course, not hesitated to include.

In consequence of the schedules issued, I have, up to the time of tabulating and calculating all the data, obtained returns of the results of amputation of the limbs from seventy-four provincial hospitals in Great Britain. From the remainder of these hospitals

<sup>1</sup> See the Sixth Annual Report of the Medical Officer of the Privy Council. London: 1864.

I have failed in procuring the necessary data. In some no register of the results of operations is kept.

The total number of cases of limb-amputation reported from those seventy-four British hospitals amounts to 3077.

The seventy-four hospitals vary much in size. In the tables which follow, I have arranged them and their results in accordance with their individual extent; or, in other words, in accordance with the number of beds which they each contain. For this purpose, I laid down the following four divisions or series, and arranged the hospitals subsequently under their respective heads, viz. :—

1. Hospitals with 25 beds and under;
2. Hospitals with 26 to 100 beds;
3. Hospitals with 101 to 200 beds;
4. Hospitals with 201 to 300 beds.

The only hospitals in Great Britain which at present contain a larger number of beds are the Royal Infirmaries of Edinburgh and Glasgow, and the four Metropolitan Hospitals of St Bartholomew's, St George's, Guy's, and the London Hospital in Whitechapel, which can each accommodate from 300 to 600 patients or more. I have already, in Chapter X., given at length the annual amputation statistics for some years back of these several hospitals. In adding the statistics of the provincial hospitals, I shall begin with those of the largest size, and proceed from thence downwards in the series. In doing so I shall collect together into separate tables all the amputation returns furnished to me pertaining to each series individually; and use for this purpose the general sums of all the amputations for all the years which I have received from each hospital. It would take up unnecessary space to print all the returns for all the included years of each provincial hospital—as I have already done of the six largest city or metropolitan hospitals above referred to. Besides, the statistical data furnished by the provincial hospitals individually are usually too small by themselves for statistical conclusions; but they become adequate for this purpose when collated and calculated together in sufficient masses.

#### FIRST SERIES.

##### PROVINCIAL HOSPITALS WITH 201 TO 300 BEDS.

There are seven hospitals only included under this head; the largest of the seven, the Royal Infirmary of Liverpool, containing 270 beds, and the smallest, the General Hospital of Birmingham, containing 223 beds. One of the seven hospitals, the Margate Royal Sea-bathing Infirmary, is (to quote the words of my friend Dr Rowe, in sending me the return of the operations) "special in its character; casualties as a rule are not admitted, but are sent to the Canterbury Hospital. Hence the entire absence in the report of operations for injury."

TABLE XII.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in Seven British Hospitals containing from 201 to 300 Beds.*

No.	Name of Hospital.	No. of Beds.	Years.	For Injury.								For Disease.							
				Thigh.		Leg.		Arm.		Fore-arm.		Thigh.		Leg.		Arm.		Fore-arm.	
				Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1	Liverpool Infirmary	270	1862-8	22	16	24	10	15	4	11	1	54	18	62	7	7	3	18	0
2	Dundee "	260	1861-8	8	4	9	6	32	13	18	1	5	2	4	4	2	1	0	0
3	Newcastle "	250	1866-8	12	6	15	8	13	8	8	1	8	2	2	0	1	0	0	0
4	Margate Royal Seabathing Infirmary	250	1864-5	0	0	0	0	0	0	0	0	23	7	19	0	5	0	2	0
5	Bristol Infirmary	242	1862-8	5	3	13		8	1	5	1	32	5	20	1	2	1	4	0
6	Aberdeen "	229	1860-8	15	10	10	3	10	0	5	0	41	9	21	4	3	1	7	1
7	Birmingham Gen. Hospital . . .	223	{ 1862-4 1866-8	19	9	39	20	33	8	18	4	54	16	23	4	5	0	9	2
Total				81	48	110	49	111	34	65	8	217	59	151	20	27	7	41	3
Mortality per cent. . . .				59.2		44.5		30.6		12.3		27.1		13.2		25.9		7.3	
Or proportionally 1 in . . .				1.7		2.2		3.2		8.1		3.6		7.5		3.8		13.6	

Total number of cases, 803 ; of deaths, 228 ; or 1 every 3.5, or 28.3 in 100, died.

Total number of amputations for injury, 367 ; of deaths, 139 ; or 1 in 2.6, or 37.8 in 100, died.

Total number of amputations for disease, 436 ; of deaths, 89 ; or 1 in 4.9, or 20.4 in 100, died.

#### *Mortality of Individual Amputations.*

Thigh cases, 298 ; deaths, 107 ; or 1 in 2.8 ; or 35.9 per cent.

Leg " 261 ; " 69 ; or 1 in 3.7 ; or 26.4 "

Arm " 138 ; " 41 ; or 1 in 3.3 ; or 29.7 "

Forearm " 106 ; " 11 ; or 1 in 9.6 ; or 10.3 "

#### SECOND SERIES.

##### PROVINCIAL HOSPITALS WITH 101 TO 200 BEDS.

This series includes twenty hospitals. Most of them range in number of beds from 101 to 150. Indeed, only one hospital on the list rises to a higher number, viz., the Sussex County Hospital, which contains 165 beds. There are four hospitals with 150 beds each ; and six with 120 beds each. The hospitals of Leeds and Nottingham, and the Northern Hospital of Liverpool, yield in this series the largest number of amputation returns. The Infirmary of Liverpool, a larger institution than the Northern Hospital of that town, is included in the preceding or first series.

TABLE XIII.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in Twenty British Hospitals containing from 101 to 200 Beds.*

No.	Name of Hospital.	No. of Beds.	Years.	For Injury.								For Disease.							
				Thigh.		Leg.		Arm.		Fore-arm.		Thigh.		Leg.		Arm.		Fore-arm.	
				Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1	Sussex . . . . .	165	1862-68	2	1	15	7	6	1	3	0	10	6	13	2	6	0	1	0
2	Chester . . . . .	150	1864-69	5	3	16	3	6	0	5	0	1	0	5	0	1	0	0	0
3	Bristol . . . . .	150	1863-65 & 1868	9	5	6	4	2	1	2	0	18	1	8	0	0	0	2	0
4	Derbyshire . . . . .	150	1862-68	10	5	15	3	3	0	2	0	13	5	16	0	2	0	6	0
5	Norfolk and Norwich . . . . .	150	1862-68	9	2	11	2	2	0	15	3	23	6	10	3	9	1	5	0
6	Radcliff, Oxford . . . . .	149	1862-68	2	1	10	3	5	0	5	0	16	1	12	2	1	1	0	0
7	Nottingham . . . . .	142	1862-68	20	5	20	3	15	2	14	1	32	5	13	2	12	2	9	0
8	Leeds . . . . .	140	1862-68	18	14	43	19	41	17	55	3	44	11	35	7	12	2	7	1
9	Shrewsbury . . . . .	140	1863-69	13	6	20	5	20	3	6	0	14	3	14	1	3	0	4	0
10	Liverpool, Northern . . . . .	134	1862-68	24	16	35	12	13	4	14	3	6	2	3	1	1	1	1	0
11	Paisley . . . . .	132	1862-68	6	0	17	2	7	1	9	0	0	0	9	2	3	0	0	0
12	North Staffordshire . . . . .	125	1862-68	13	4	41	13	12	1	6	1	15	4	7	0	0	0	0	0
13	Inverness . . . . .	120	1862-68	1	0	4	1	0	0	1	0	2	1	1	1	1	0	2	1
14	Bath Royal United . . . . .	120	1862-68	3	2	5	3	5	1	5	0	26	7	12	2	2	0	1	0
15	Reading (Royal Berks) . . . . .	120	1862-68	8	1	10	2	6	0	10	3	26	3	16	0	2	0	2	0
16	Liverpool, Southern . . . . .	120	1862-68	7	2	13	6	17	5	4	0	7	1	8	0	4	1	1	1
17	Kent and Canterbury . . . . .	120	1862-68	2	1	1	1	6	0	8	0	8	0	5	1	1	0	9	0
18	Buxton . . . . .	120	1861-67	1	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
19	Greenock . . . . .	119	1862-68	9	5	5	0	11	4	1	0	1	0	1	0	1	0	0	0
20	Rochester . . . . .	108	1863-68	5	1	4	0	1	0	1	0	2	1	3	0	0	0	1	0
Total.				167	74	292	89	178	40	166	14	264	57	191	24	61	9	51	3
Mortality per cent. . . . .				44.3		30.4		22.4		8.4		21.5		12.5		6.7		5.9	
Or proportionally 1 in . . . . .				2.2		3.2		4.4		11.8		4.6		8		14.7		17	

Total number of cases, 1370; of deaths, 310; or 1 in every 4.4, or 22.6 in every 100, died.

Total number of amputations for injury, 803; of deaths, 217; or 1 in every 3.7, or 27 in every 100, died.

Total number of amputations for disease, 567; of deaths, 93; or 1 in every 6.1, or 16.4 in every 100, died.

If we combine together the amputations for injury and for disease, the mortality from the individual amputations is as follows:—

*Mortality of Individual Amputations.*

Thigh	cases, 431;	deaths, 131;	or 1 in 3.3;	or 30.4 per cent.
Leg	„ 483;	„ 113;	or 1 in 4.2;	or 23.4 „
Arm	„ 239;	„ 49;	or 1 in 4.8;	or 20.5 „
Forearm	„ 217;	„ 17;	or 1 in 12.7;	or 7.8 „

THIRD SERIES.

PROVINCIAL HOSPITALS WITH 26 TO 100 BEDS.

This list includes thirty British hospitals. Four of them contain 40; three of them 50; three of them 60; three of them 90; and

five of them 100 beds each. The largest numbers of amputations returned in this series are from two hospitals belonging to maritime towns—namely, Plymouth and Cardiff.

TABLE XIV.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in Thirty British Hospitals containing from 26 to 100 Beds.*

No.	Name of Hospital.	No. of Beds.	Years.	For Injury.								For Disease.							
				Thigh.		Leg.		Arm.		Fore-arm.		Thigh.		Leg.		Arm.		Fore-arm.	
				Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
1	York . . . . .	100	1862-8	4	1	2	0	1	0	1	0	5	0	5	0	4	0	1	0
2	Worcester . . . . .	100	1863-8	9	4	22	0	8	0	9	1	0	0	10	1	1	0	2	1
3	Lincoln County . . . . .	100	1862-8	6	2	5	1	5	2	4	0	11	1	8	1	4	0	4	0
4	Dumfries . . . . .	100	1862-8	2	1	5	3	4	1	2	0	2	2	9	1	3	0	0	0
5	R. South Hants . . . . .	100	1862-8	3	2	7	3	2	0	8	0	8	3	2	0	2	0	3	0
6	Salisbury . . . . .	98	1862-8	7	4	2	0	4	0	1	0	17	3	4	0	4	1	8	0
7	Cheltenham . . . . .	90	1862-8	5	3	5	1	4	1	1	0	7	0	3	1	0	0	0	0
8	Plymouth . . . . .	90	1863-8	13	2	10	2	7	1	5	0	9	1	2	0	2	1	4	0
9	Taunton . . . . .	90	1866-8	1	1	2	1	2	0	4	0	3	0	0	0	0	0	0	0
10	Montrose . . . . .	70	1863-9	1	1	0	0	2	1	0	0	5	2	0	0	1	0	4	1
11	Lancaster . . . . .	70	1865-8	2	1	7	2	1	0	3	1	0	0	0	0	0	0	0	0
12	Truro . . . . .	60	1862-8	7	2	8	0	7	0	2	0	11	0	6	0	1	1	2	0
13	Chichester . . . . .	60	1862-9	1	0	3	0	3	2	3	0	4	1	6	3	1	0	1	0
14	North Riding . . . . .	60	1864-9	4	1	7	3	2	1	1	0	1	0	4	1	1	0	0	0
15	Royal Surrey County . . . . .	54	1866-9	5	1	1	1	1	1	0	0	4	1	2	0	0	0	2	0
16	W. Norfolk and Lynn . . . . .	52	1862-8	2	1	1	0	7	1	1	0	10	2	7	1	2	0	0	0
17	Monkland . . . . .	50		0	0	0	0	0	0	0	0	1	0	0	0	1	0	0	0
18	Cardiff . . . . .	50	1862-9	10	4	17	6	7	0	3	0	3	0	4	1	0	0	0	0
19	Halifax . . . . .	50	1862-8	2	1	7	3	15	3	7	1	6	0	10	0	1	0	0	0
20	Balfour, Kirkwall . . . . .	48		0	0	0	0	1	1	3	0	6	0	9	0	0	0	1	0
21	Huntingdon . . . . .	42	1862-8	3	1	4	1	3	1	2	0	3	1	3	1	2	0	0	0
22	Denbigh . . . . .	40	1862-9	1	1	0	0	0	0	3	1	4	0	4	1	1	0	2	0
23	Bridgewater . . . . .	40	1862-8	4	2	4	0	0	0	5	1	3	1	1	1	0	0	0	0
24	Stamford . . . . .	40	1862-8	3	1	2	1	2	0	1	0	8	2	3	1	1	0	1	0
25	Carmarthenshire . . . . .	40	1862-8	2	0	7	1	1	0	1	0	0	0	1	0	0	0	3	0
26	Hartlepool . . . . .	36	1865-9	1	0	3	0	1	0	0	0	0	0	0	0	0	0	0	0
27	Hertford . . . . .	35	1863-9	3	1	2	1	1	0	4	0	0	0	0	0	0	0	0	0
28	Swansea . . . . .	34	1862-8	2	1	17	3	6	1	1	0	2	0	7	0	2	0	1	0
29	Great Yarmouth . . . . .	28	1862-9	1	0	2	1	1	0	5	0	2	0	3	0	1	0	1	0
30	Ramsgate . . . . .	26	1865-8	2	0	1	0	0	0	1	0	0	0	0	0	0	0	0	0
Total				106	39	153	34	98	17	81	5	135	20	113	14	35	3	40	2
Mortality per cent. . . . .				36.8		22.2		17.3		6.1		14.7		12.4		8.5		5	
Or proportionally 1 in . . . . .				2.7		4.5		5.7		16.2		6.7		8		11.6		20	

Total number of cases, 761 ; of deaths, 134 ; or 1 in every 5.6, or 17.6 in every 100, died.

Total number of amputations for injury, 438 ; of deaths, 95 ; or 1 in every 4.6, or 21.6 in every 100, died.

Total number of amputations for disease, 323 ; of deaths, 39 ; or 1 in every 8.3, or 12 in every 100, died.

If we combine together the amputations for injury and for disease, the mortality from the individual amputations is as follows :—

*Mortality of Individual Amputations.*

Thigh cases,	241;	deaths,	59;	or 1 in	4	; or	24·4	per cent.
Leg	266;	48;	or 1 in	5·5;	or 18	„		
Arm	133;	20;	or 1 in	6·6;	or 15	„		
Forearm	121;	7;	or 1 in	17·2;	or 5·8	„		

FOURTH SERIES.

PROVINCIAL HOSPITALS WITH 25 BEDS AND UNDER.

This series includes within it chiefly the so-called Cottage Hospitals of Great Britain. They have been usually opened, in the first instance at least, in houses that had been previously used as private dwellings. According to Mr Churchill's Directory, the largest "cottage hospital" in England, and one of the earliest, is that of Middlesborough in Yorkshire, which contains 25 beds. Some of them are much smaller. The hospitals at Fowey in Cornwall, and Shedfield in Hampshire, contain only four beds each; and that of Shotley Bridge, Durham, though it is only provided with five beds, has already a list of ten limb-amputations. The first cottage hospitals in England were, I believe, founded about ten years ago; and one or two of the returns include the interval from that time to this. But most of them are much later. The small general Infirmaries of Kidderminster, Bridgnorth, and Brecknock, which contain 11 or 12 beds each, date their returns from 1862.

TABLE XV.—*Results of the Four Amputations of the Thigh, Leg, Arm, and Forearm, in Seventeen British Hospitals with 25 Beds and under.*

Name of Hospital.	No. of Beds.	For Injury.								For Disease.							
		Thigh.		Leg.		Arm.		Fore-arm.		Thigh.		Leg.		Arm.		Fore-arm.	
		Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.	Cases.	Deaths.
Middlesborough . . . . .	25	3	1	20	3	7	1	0	0	1	0	6	0	1	0	0	0
Penrhyn . . . . .	18	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Barrow . . . . .	18	1	0	2	0	4	0	4	0	0	0	0	0	0	0	0	0
Teignmouth . . . . .	17	1	0	1	1	0	0	0	0	0	0	0	0	0	0	0	0
Gravesend . . . . .	15	5	1	1	1	0	0	4	2	1	0	0	0	0	0	0	0
Kidderminster . . . . .	12	0	0	5	1	3	0	5	0	0	0	0	0	0	0	0	0
Brecknock . . . . .	12	0	0	1	0	2	0	1	0	0	0	3	0	0	0	0	0
Bridgnorth . . . . .	11	2	1	3	1	0	0	2	0	0	0	0	0	0	0	0	0
Savernake . . . . .	10	0	0	0	0	0	0	1	0	1	0	0	0	1	0	0	0
Dinorwic . . . . .	8	1	0	0	0	0	0	1	0	2	0	0	0	0	0	0	0
Cranleigh . . . . .	6	1	0	0	0	0	0	1	1	2	1	0	0	1	0	1	0
Shotley Bridge . . . . .	5	7	2	2	1	1	0	0	0	0	0	0	0	0	0	0	0
Fowey . . . . .	4	3	0	1	0	0	0	0	0	0	0	2	0	0	0	0	0
Oswestry . . . . .		0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
Walsall . . . . .	24	0	0	1	0	4	0	3	0	3	1	6	0	2	1	2	0
Shedfield . . . . .	4	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0
Ditchingham . . . . .	10	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0
Total . . . . .		24	5	38	8	22	1	24	3	10	2	17	0	5	1	3	0
Mortality per cent . . . . .		20·8		21		4·5		12·5		20		0		20		0	
Or proportionally 1 in . . . . .		4·6		4·7		22		8		5		0		5		0	

Total number of cases, 143 ; of deaths, 20 ; or 1 in every 7·1, or 14 in every 100.

Total number of amputations for injury, 108 ; of deaths, 17 ; or 1 in every 6·3, or 15·7 in every 100.

Total number of amputations for disease, 35 ; of deaths, 3 ; or 1 in every 11·6, or 8·6 in every 100.

If we combine together the amputations for injury and for disease, the mortality from the individual amputations is as follows :—

*Mortality of Individual Amputations.*

Thigh cases,	34 ;	deaths, 7 ;	or 1 in every 4·8 ;	or 20·6 per cent.
Leg	„ 55 ;	„ 8 ;	or 1 in every 6·8 ;	or 14·5 „
Arm	„ 27 ;	„ 2 ;	or 1 in every 13·5 ;	or 7·4 „
Forearm „	27 ;	„ 3 ;	or 1 in every 9 ;	or 11·1 „

The three first series of provincial hospital returns given in the preceding tables contain respectively 803, 1370, and 761 limb-amputations. These several masses of data afford perhaps in each series a sufficient foundation for arriving at fair and reliable statistical inferences. In the fourth series, the data are as yet too small for coming to any very certain statistical conclusions on the subject ; and a few years will need to elapse before our cottage hospitals can furnish a sufficient basis of data for more decided and determinate results. Perhaps the data which already exist ought to give a more favourable view of the salubrity of these cottage hospitals for operative purposes than the last of the preceding series of tables indicates. For in reference, for example, to the “Oswestry Cottage Hospital,” Dr Blaikie has returned to me under its schedule twelve successful limb-amputations without a death, though I have entered only one of these. This is the only case that has occurred in the newly opened cottage hospital at Oswestry ; but the eleven other successful cases had previously occurred in the small Workhouse Infirmary of Oswestry, which was the predecessor of the cottage hospital, and may justly, perhaps, be assimilated with it, and placed, as is done by Dr Blaikie, in the same table. Again, in consequence of it being stated in Mr Churchill’s Medical Directory that the Balfour Hospital at Kirkwall contained 48 beds, I entered it and its results in the third of the preceding tables of provincial hospitals. Since, however, these tables were calculated and finished, I have, in a conversation with Dr Logie, surgeon to the hospital, been assured by him that the institution has never had above 12 beds, though, being established in a large and old dwelling-house, it might accommodate more ; and truly, therefore, it belongs to the series of cottage hospitals. If we are justified, then, in adding to the limb-amputations performed in hospitals with 25 beds or less, the Oswestry and Kirkwall returns, instead of having in the fourth series of these small provincial hospitals 143 limb-amputations with 20 deaths, or 1 in every 7, the list should be extended to 174 cases of limb-amputations with 21 deaths, or 1 death in every 8.



CHAPTER XIV.—THE MORTALITY OF LIMB-AMPUTATIONS AS REGULATED BY THE SIZE OF HOSPITALS, AND THE DEGREE IN WHICH PATIENTS ARE AGGREGATED OR ISOLATED.

In the two previous parts of these communications on Hospitalism we have seen that in our large metropolitan hospitals about 41 in every 100 operated on die of those patients who are subjected to the four major amputations of the limbs; while in single or isolated rooms in country practice patients die, under the very same class of operations, to the extent only of 10 or 11 in every 100. In the last Chapter we have collected evidence of the death-rate from these same four major limb-amputations in British provincial hospitals of various sizes. If we throw the whole facts thus collected into a tabulated form, the general results may be stated as follows:—

	<i>Size of Hospital, etc.</i>	<i>Death rate.</i>
1st Series.—In large and metropolitan British hospitals, chiefly containing from 300 to 500 beds or upwards, out of 2089 limb-amputations 855 died, or		1 in 2·4
2d Series.—In provincial hospitals containing from 201 to 300 beds, out of 803 limb-amputations 228 died, or		1 in 3·5
3d Series.—In provincial hospitals containing from 101 to 200 beds, out of 1370 limb-amputations 301 died, or		1 in 4·4
4th Series.—In provincial hospitals containing from 26 to 100 beds, out of 761 limb-amputations 134 died, or		1 in 5·6
5th Series.—In provincial hospitals containing 25 beds or under, out of 143 limb-amputations 20 died, or		1 in 7·1
6th Series.—In British private country practice, with the patients operated on in single or isolated rooms, out of 2098 limb-amputations 226 died, or		1 in 9·2

These data go to point out and establish the general fact or general law in hospital hygiene, that the death-rate accompanying amputation of the limbs,—and, as we may infer, the death-rate accompanying other surgical operations, and many medical diseases also,—is regulated, *ceteris paribus*, in a striking manner by the size of the hospitals, and the degree of aggregation or segregation in which the patients are treated. But like all other general laws in medicine, this law is subject to many exceptions. Thus, a small hospital, if overcrowded with beds and patients, becomes as insalubrious as a large hospital under one roof. On the other hand, a large hospital would be generally made almost as salubrious as a small institution, provided few beds were left scattered over its wards, and these wards were well ventilated and often changed. But such exceptions only establish more securely the great hygienic law, that, in the treatment of the sick, there is ever danger in their aggregation, and safety only in their segregation; and that our hospitals should be constructed so as to avoid as far as possible the former, and secure as far as possible the latter condition.

